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THE

Journal of Obstetrics & Gynaecology of the British Empire

VOL. 54, No. 6 NEW SERIES DECEMBER, 1947

The Fourth of November, 1847: James Young Simpson and Chloroform Anaesthesia

BY

JAMES MILLER, M.D.

THE story of the discovery of the anaesthetic properties of chloroform, surely one of the most romantic in the history of medicine, has often been told, but in view of the centenary of the occurrence it is right and proper that it be once more recounted. Ether had been found in 1846 and had been used for the induction of anaesthesia in midwifery and surgery. One man at least—James Young Simpson—was not satisfied, and he bent his great energy and outstanding talents towards the discovery of "something better."

A few days before the 4th November, 1847, Simpson and his private assistant, James Matthews Duncan, a young Aberdeen graduate of 21, went to the laboratory of Dr. Gregory, professor of chemistry, in search of "substances which had respirable vapours." The search was conducted in a lumber room below the seats of the chemistry classroom, and a selected few substances, chloroform among them, were removed to a cupboard in the waiting-room of 52 Queen Street, Edinburgh, the residence of Professor Simpson.

On the day of the discovery Matthews Duncan experimented on himself with these substances and picked out several as deserving of more careful investigation. We have no details of this trial, which was the first time chloroform was inhaled so far as is known, and Matthews Duncan was always very reticent on the subject. He tells us, however, in a letter to Sir Robert Christison, written in 1875, that he took particular notice of chloroform "as the best and likely to be most useful judging from its effects on myself."

The same evening, the 4th November, three men seated themselves at Professor Simpson's dining-room table. In front of each was a tumbler in which about a teaspoonful of the substance to be respired was placed. The tumbler in its turn was immersed in a basin of hot water. "Holding the mouth and nostrils over the vessel's orifice, inhalation was proceeded with, slowly and deliberately; all inhaling at the same time, and each noting the effects as they advanced." Having inhaled several substances, including acetone and benzine, without effect, the trio, Simpson, Duncan and Keith, tried chloroform. "Immediately," as the narrator, James Miller, professor of surgery, says, "an unwonted

hilarity seized the party; they became bright-eyed, very happy and very loquacious—expatiating on the delicious aroma of the new fluid. The conversation was of unusual intelligence, and quite charmed the listeners—some ladies of the family and a naval officer, brother-in-law of Dr. Simpson. But suddenly there was a talk of sounds being heard like those of a cotton-mill, louder and louder; a moment more, then all was quiet and then—a crash. On awaking, Dr. Simpson's first perception was mental—'This is far stronger and better than ether,' said he to himself. His second was to note that he was prostrate on the floor, and that among the friends about him there was both confusion and alarm. Hearing a noise, he turned round and saw Dr. Duncan beneath a chair; his jaw dropped; his eyes staring, his head bent half under him; quite unconscious, and snoring in a most determined and alarming manner. More noise still, and much motion —and then his eyes overtook Dr. Keith's feet and legs making valorous efforts to overturn the supper-table or, more probably, to annihilate everything that was on it. I say, more probably; for frequent repitions of inhalation have confirmed, in the case of my esteemed friend, a character for maniacal and unrestrainable destructiveness—always, under chloroform, in the transition stage."

The experience was repeated many times that night—one of the ladies even taking her turn—until the supply of chloroform was exhausted. This account of the proceedings by Professor Miller is stated by Matthews Duncan and Keith* to be approximately correct.

No time was lost in putting the new anaesthetic to use. The first child born of a mother who received chloroform was delivered on November 9th. On the 10th Simpson went to the Royal Infirmary where his colleague in surgery had two operations to perform. The first patient was a Highland boy, 4 or 5 years old, affected with necrosis of the radius. Simpson thus describes the effects: "On holding a handkerchief, on which some chloroform had been sprinkled, to his face, he became frightened, and wrestled to be away. He was held gently however and obliged to inhale. After a few inspirations, he ceased to cry or move, and fell into a sound snoring sleep." The operation was then performed, and "Half an hour afterwards, he was found in bed, like a child newly awakened from a refreshing sleep, with clear, merry eye, and placid expression." It is interesting to note that the second surgical case anaesthetised immediately after this one, a soldier with a face operation, showed his approval of the new agent by cramming the sponge soaked in chloroform into his mouth and re-starting the process of administration on his own.

So much for the events of November 1847. Now a few words about Simpson and his associates in the research.

James Young Simpson has been so often the subject of biography that it would be superfluous for me to enter into detail in this short note. My special qualification for the office of recorder is that I am linked to the greatest era of the Edinburgh medical school—the '40s and '50s of last century —by my father who was a pupil of Simpson and by my grandfather, who was one of his colleagues and closest friends. For some years they lived next door to one another, and thus it came about that James Miller was able to relate so intimately the events above described.

Anyone asked to select the half dozen greatest men of Scottish birth in the 19th century would, I feel sure, include Simpson among them. He came of humble origin

* Keith states that the inhalation was not carried out by all three at the same time.

and rapidly attained to eminence. We are apt to think that the idea of "too old at 40" is a modern one, but we must remember that of the group of men holding medical chairs in Edinburgh university during the middle of last century almost all received their appointments in their 20's or 30's. Robert Christison was 25 when he became professor, James Syme was 34, James Miller 30 and Simpson 28. His election to the chair of midwifery was secured by a majority of only one vote.

In stature Simpson was short, but he had broad shoulders and his figure, especially in the fur coat which he was accustomed to wear, was squat. He had neither the build nor the skill of a great surgeon. His head was large, and this appearance of great size was enhanced by the thick mane of auburn hair which he wore long, as was then customary. In most of his portraits his expression was genial, but in repose and in some of the pictures which we have the look is sad. That does not mean that he was devoid of wit and humour. Far from it. His house was always full of guests and the host was the centre and soul of the entertainment. Even amateur theatricals were occasionally indulged in, and Eve Blantyre Simpson recalls seeing her father's sturdy form appear before the footlights with a colleague, Lyon Playfair, both dressed in short petticoats as the Babes in the Wood and both sucking oranges and crying lustily.

Simpson's versatility was remarkable. He wrote copiously on many subjects, notably, like Rudolf Virchow, on archaeology. He had no relaxations in the ordinary sense of the word and he played no games. He relished a walk, or a scamper as he called it, and he paid frequent visits to the continent of Europe. He escaped from the insistent calls of his profession by driving down to Trinity, where he had a house three miles from Queen Street and where he enjoyed, as he was accustomed to put it, "a sunset and boiled egg."

His practice was enormous and he drove through the streets of Edinburgh at something approaching a hand gallop, the police having special instructions concerning him. He never wasted a moment. He could be seen standing outside a patient's door while the bell was being answered, with a book in his hand. "How do you get time," asked a patient, "to read all the novels of the day?" "By never wasting an orra moment," was the reply. He had, like many another man who has reached eminence, the capacity to sleep at any moment and in all circumstances, even in his carriage. But although he usually drove in his carriage to see his patients he was not above climbing long stairs in the Old Town to visit the poor. His patients were devoted to him, and as one old lady said, "His blithe, silvery-toned voice, the lightsomeness he brought in with him, did her more good than any medicines ever invented." Nor was it only spiritual comfort which he scattered. He would remark to some unfortunate that it would be a favour to call upon him for a loan if necessary—"For I was poor too," he said, "and if my brothers hadn't helped me without stint, I would not be where I am to-day."

In money matters Simpson was casual, and his faithful butler was accustomed to collect the guineas from his pockets at the close of a day of consultations. On the other hand he would refuse a fee if he arrived too late to do anything or if the patient's condition was beyond hope. On one occasion he refused a fee of a thousand pounds to attend a lady in Brighton, as he knew her to be a *malade imaginaire*. Very naturally he regarded such a visit as a sheer waste of time.

He was in many ways in advance of his time, as witness his advocacy of the pavilion type of building for hospitals. He proposed

the erection of cheap, one-storied blocks separated from each other by wide air spaces, his idea being to prevent the transference of infection, to allow of the building being taken down readily should an epidemic occur, and behind it all was the notion of the healing power of Nature if left to herself.

He died at the comparatively early age of 59. Like Sir Walter Scott he suffered in his later years from arteriosclerosis. Byrom Bramwell gives an account of what was found at the autopsy. The main cause of death was atheroma of the arteries and an aneurysm the size of a pigeon's egg in the heart. Furthermore, all the organs showed pronounced fatty degeneration, a feature which may not have been unconnected with the repeated use of toxic drugs during his experiments on himself. Even after his discovery of chloroform he continued to test other compounds and was found by his butler on one occasion lying unconscious on his study floor.

His death was widely mourned and a resting place in Westminster Abbey was offered by the nation. His wife, however, chose that his remains should lie in the place in which he had laboured. The headstone in Warriston Cemetery looks up towards the towering dark city, crowned by the Castle rock.

No mention of the discovery of chloroform would be complete without a reference to at least one of Simpson's associates—James Matthews Duncan. As already stated, and as James Haig Ferguson mentions in his presidential address to the Edinburgh Obstetrical Society, "It is an open secret that some of his friends thought he never received the recognition which was due to him for his share in the discovery, as there seems little doubt but that he had previously tested the properties of chloroform upon himself before calling Professor Simpson's special attention to it." Duncan was a man of outstanding ability—manly, blunt, witty and genial. Haig Ferguson describes him as the embodiment of the Hippocratic ideal, the type of the perfect physician. As is well known, after failing to obtain the chair of Obstetrics in Edinburgh following the death of Simpson, he migrated to St. Bartholomew's hospital, London, where he acquired a great reputation for skill as a gynaecologist. He died in 1890 at the age of 64.

Finally, let me remind you that the research which led up to the discovery of chloroform was carried out at the end of a long day of operating, consulting and teaching. Simpson's stock-in-trade was courage, vision and perseverance. His apparatus was of the simplest—a tumbler—and his laboratory was his own dining-room.

Diagnostic and Therapeutic Aspects of Kymographic Uterotubal Insufflation with Comparative Observations on Hysterosalpingography*

BY

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ANY discussion of the diagnostic procedures employed nowadays in the investigation of sterility in the female calls to mind the striking departure from the casual examination which was practised by gynaecologists as well as by family physicians at the beginning of this century. The superficial examination could scarcely be expected to throw much light in the cause of the sterility. It consisted for the most part of making a bimanual examination, upon the findings of which were formulated prognosis and therapeutic advice.

Inspection of the vagina and cervix by means of the speculum and the occasional exploration with the uterine sound ventured by the more thoughtful gynaecologists and general practitioners shed little more light on the situation. Based upon the meagre findings obtained by the use of these simple physical aids, procedures were devised that constituted the the alpha and the omega of the measures calculated to cure sterility.

These mistakes were inevitable because the upper portion of the genital tract, namely the Fallopian tubes, were inacessible to ready exploration. An exploratory laparotomy for the sole purpose of determining the anatomical condition of the Fallopian tubes was deemed a formidable procedure. For laparotomy was not without serious hazards in those days and it was therefore both feared by patients and hesitantly performed by gynaecologists.

This impasse was finally surmounted by hysterosalpingography and soon thereafter by uterotubal insufflation. Both procedures arose as a result of the realization, some 3 or 4 decades ago, that many of the surgical operations formerly employed to relieve sterility were futile and ill-considered. In 1914 Cary and Rubin independently published the idea of injecting X-ray-opaque substances into the uterus for the specific purpose of determining, without recourse to laparotomy, whether the Fallopian tubes are open or closed. Cary reported using collargol and published his paper in the *American Journal of Obstetrics*, March 1914. Rubin also used collargol and published his paper in the *Zentralblatt fur Gynäkologie*, May 1914. The work upon which Rubin's report was based was done at the II Universitat Frauenklinik of which Von Rosthorn was the head. The paper was submitted for publication in February of 1914.

As both these papers were published just before the first world war we did not become aware of similar work by others until some years later. Douay presented some historic data in his report before the 5th Congress of the Association of French Gynaecologists and Obstetricians at Lyons,

*Communicated to International Congress of Obstetricians and Gynaecologists to celebrate the Bicentenary of the Rotunda Hospital, Dublin, 10th July, 1947.

September 1927. In this report Douay stated that Lelorier was the first to inject an isotonic non-irritant fluid into the uterus with the object of determining tubal patency. His results were to have been presented before the Congress at Lille in 1912, and were never published. Lelorier believed that if 20 ml. of this fluid were injected and none returned from the cervix, it was proof that the Fallopian tubes were patent.

According to Douay's report, Dimier deserves credit for being among the first to inject into the uterus a fluid opaque to the X-rays. Dimier's attempts were made in 1913 upon patients in the Broca Hospital, under the direction of Pozzi. He used a 10 per cent solution of collargol and injected 7 to 8 ml. Inasmuch as one patient died of peritonitis, Pozzi made Dimier abandon his research. Owing to the first world war the paper was not published until 1916, when it appeared over the signature of Dartigues.

According to Schultze, however, the first recorded attempt to use a radiopaque substance was made by Rindfleisch who used an emulsion of bismuth in 1910. The Roentgenographic shadows obtained by this method were poor and apparently did not encourage others to employ it.

I record these facts because they illustrate the parallel and almost simultaneous response to an apparently long-felt need for a method that would enable us to diagnostic patency or non-patency of the Fallopian tubes without resorting to exploratory laporatomy.

Use of these substances all had the same objective, namely to visualize Roentgenoscopically the lumen of the Fallopian tubes. They were followed in rapid succession by sodium bromide, sodium iodide, and thorium nitrate, 1914 to 1919 (Rubin). Kennedy's report on the use of sodium bromide in 1923 apparently gave impetus to wider application of hysterosalpingography. Sodium bromide had been previously abandoned by Rubin and gained no permanent adherents. It was soon supplanted by iodized oils, which found their chief form in lipiodol. Introduced by Siccard and Forrestier in 1922 lipiodol was first employed in gynaecology by Carl Heuser in 1923. Other contrast-media soon thereafter came into use but not as extensively as lipiodol. These substances were lipo-iodine, thorotrast, umbrathor, iodochloral and the soluble crystalloid iodine substances. Skiodan with acacia (Titus) and viscorayopaque (Rubin) are the most recent developments. In these media it was sought to combine the physical properties of viscosity with relatively rapid resorbability.

I have used practically all these radiopaque substances but not without realizing the disadvantages attaching to the majority of them. Having begun my work with the attempt to demonstrate the presence of submucous myomata which were notoriously refractory to X-ray treatment and to radium as used about 1914, I have come to realize that hysterography *per se* has a place in the study of sterility which is invaluable. There is need, however, to emphasize once more, as I have been at pain to emphasize on previous occasions, that salpingography has drawbacks that are not sufficiently appreciated. It is not generally realized that once the Fallopian tubes are filled with lipiodol they frequently cannot, if the tubes are stenosed or obstructed, rid themselves of the oil, especially if it is trapped at some point of the ampullary portion.

Hysterosalpingography has been compared, by some of its advocates, to barium X-ray of the intestines. There is one difference which makes that comparison invalid, because the oil cannot be cleared out of the Fallopian tube as barium can be

evacuated from the colon. If barium is retained in the colon and is not spontaneously expelled, it can be eliminated by enema or purgatives. Retention of lipiodol is due to the fact that peristalsis is partially or totally inhibited by the pathologically altered muscle of the tubal walls. This prevents the tube from ridding itself of the retained iodized oil, which is too viscous to pass through a stenosed point in the tubal lumen. When there is no tubal obstruction the oil can find its way into the peritoneal cavity whence it disappears after varying lengths of time.

My early experience with collargol, which was found to remain inspissated in the lumen of normal Fallopian tubes, led me away from the use of radiopaque substances which included the halogen salts that I sought to substitute for collargol. Later work with lipiodol resulted in similar findings. Foreign-body granulomata produced by retained lipiodol were not infrequently encountered. The foreign-body reaction is induced by persistence of the iodized oil at tight points in the lumen which are nevertheless permeable to some slight degree, as previously determined by insufflation with carbon dioxide. In such cases the ultimate result is that permanent occlusion replaces permeable strictures.

I feel that gas could not possibly induce such changes and hence began to use oxygen for injection into the uterus in November 1919.

Oxygen was found to be satisfactory as a gaseous medium, but it caused pains in the shoulders which persisted for from one to several days. This disadvantage was soon relieved by substituting carbon dioxide, which is rapidly resorbed and, if the patient is placed in the Trendelenburg position at once, the shoulder pains disappear promptly and do not return when she rises from the examining table. Thus a perfectly harmless gas is tolerated while it serves to establish the fact of tubal patency or non-patency, and has the advantage over radiopaque substances that it leaves no residue. The gas rises promptly from the pelvis to the subphrenic space where it is rapidly resorbed. Its applicability to manometric control, in contrast to what is physically more difficult to obtain in oil injection, and the combination of a kymograph have made uterotubal insufflation a safe and scientific clinical method for testing for tubal patency and various degrees of tubal obstruction.

The point of the physical difference between gas and fluid has not been sufficiently appreciated by many workers, one might almost say most workers who employ lipiodol or other iodized oils exclusively. The ideal radiopaque substance which shall fulfil all the requirements for clinical diagnostic purposes, including rapid disappearance from the Fallopian tubes under all circumstances, has not yet been achieved. Its nearest approach has been realized in viscorayopaque, which is a combination of a crystalloid iodine substance—diethanolamine salt of 2:4 dioxo-3- iodo-6- methyltetrahydropyridine acetic acid—with polyvinyl alcohol. The latter gives it a viscosity which has been intentionally made to equal or exceed the viscosity of lipiodol. Viscorayopaque nevertheless is followed, despite all attempts to the contrary, in a certain number of cases by pelvic pain not unlike the reaction attending and ensuing after lipiodol injection. This disability, which it produces alike with the iodized oils and the halogen salts, is not as long in duration and can be obviated by analgesics such as demerol, or a combination of codein, phenacetin and aspirin which may be given prophylactically.

In contrast to this reaction following the intrauterine injection of radiopaque solutions there is no pelvic pain whatever

after the insufflation of carbon dioxide. Since the gas rises to the subphrenic space as soon as the patient sits up or stands, the pain is localized in the shoulders and, as has been said before can be made to disappear promptly by the reclining posture. But carbon dioxide gas leaves no residue within the Fallopian tubes and hence does not induce permanent occlusion in stenotic but partially patent Fallopian tubes. It has a further advantage that it can be used repeatedly for therapeutic purposes, an advantage not shared by radiopaque solutions.

An advantage claimed by many who employ hysterosalpingography exclusively is that by this method the site of occlusion or partial stenosis may be graphically demonstrated. I have been able by careful control with roentgenography of the tubes to show that the site of obstruction can be equally diagnosed by means of kymographic uterotubal insufflation. It only requires careful notice of the radiation of the momentary pain which accompanies the insufflation, the same or less intense pain that is encountered during hysterosalpingography. Many observations at laparotomy, preceding and following uterotubal insufflation, and experimental studies have corrobrated the interpretation of the pain-radiation. In combination with the salpingograph obtained by kymographic uterotubal insufflation, the diagnosis of the site of obstruction can be made in practically all cases, or, to put it another way, for all practical purposes.

It should be noted in this connexion that the interpretation of the lipiodol films is subject to considerable difference of opinion in many cases, and that it requires much experience and skill to establish the fact of patency or not in an appreciable number of instances. When in doubt, it is much safer and more convenient to repeat uterotubal insufflation than to inject lipiodol. I shall not enter further into other details which have been published in my monograph and elsewhere concerning this point. But one item of considerable importance must be mentioned, namely, that the hazards of lipiodol-injection are greater than those attending or following uterotubal insufflation and that, after repeated injection of iodized oils in the same patient, these hazards are vastly greater than after repeated insufflation.

I have, for example, insufflated one patient, with secondary amenorrhoea of 10 years' duration, more than 50 times for scientific purposes over a period of several years without the slightest untoward sequelae. Sharman has done daily insufflations on several patients throughout several menstrual cycles without encountering any reactions. This cannot be said of repeated injections of lipiodol which it would be foolhardy to use to the same degree. Schultze reported a pelvic infection following a second salpingography. One may obtain a fair comparison between the incidence of infections after injection of lipiodol from Gauss's report on 3,000 collected cases, which he found suitable for critical review, and the report obtained in answer to my personal questionnaire in 1928, which included 6,821 insufflations from various sources. There were 13 infections following the 3,000 injections of lipiodol, an incidence of 1 in 230 cases; there were 4 infections following the 6,821 insufflations, an incidence of 1 in 1,705 cases.

Schultze analyzed 8,000 lipiodol cases from the literature and found 27 complications, about 1 in 300 cases. In a later and larger personal questionnaire comprising 80,376 tubal insufflations, the incidence was 0.0024 per cent (1 in 423) representing 190 pelvic infections. This incidence naturally includes various factors such as lack of experience on the part of many employing

insufflation, in the same way as inexperience undoubtedly is accountable when lipiodol is used. If the indications and contra-indications are constantly borne in mind, and the method is carried out correctly, there need be no accidents when uterotubal insufflation is employed. An illustration of this statement is the report of George Gray Ward and Albert H. Aldridge who had not encountered a serious accident in 3,000 insufflations.

There was a total of 15 embolisms reported in all answers to the questionnaire comprising the 80,376 insufflations. Twelve cases recovered and 3 died. It is noteworthy that in one well-documented group comprising 17,177 insufflations there were 3 embolisms and all 3 recovered. In another less-documented group comprising 41,472 insufflations there were 6 embolisms and 1 died. In a small group comprising 7 per cent of all the replies there were recorded 5 embolisms, 3 of which resulted in death. The reporters of this group did not give permission for publication of their names. Embolism occurred only when air or oxygen was used. There were no deaths following insufflation with carbon dioxide. The physical properties of carbon dioxide, chiefly its solubility in equal volumes of fluid and its rapid resorbability, account for its absolute safety.

Although I do not use iodized oils or even viscorayopaque for tubal diagnosis except in rare cases, I believe there is still excellent use for hysterography *per se* in sterility and for other gynaecological conditions. One can get a good idea of the inner configuration of the uterus and demonstrate the presence of polypi and submucous myomata, of adenomyosis and developmental anomalies such as bicornuate uterus and the like, by means of uterine radiography, and I have employed this method as far back as 1914 for this purpose. It will probably hold its place as a diagnostic procedure in sterility as an alternative to uteroscopy, which will undoubtedly be more frequently employed in the future.

Diagnostic Aspects of Uterotubal Insufflation.

The technical procedure employed in the last 22 years includes use of a kymograph in combination with a manometer and tank of carbon dioxide, and may therefore be termed kymographic, uterotubal insufflation. By means of this apparatus all the essential diagnostic data may be obtained with reference to patency, nonpatency, partial stenosis, tubal spasm and hypotonicity. These 5 categories comprise all the physiological and pathological conditions of the Fallopian tubes as encountered in clinical practice and they will be discussed briefly in the order named.

Normal tubal patency is characterized by a relatively low initial rise of pressure usually below 100 mm. Hg, followed by a more or less sharp drop, which is soon succeeded by manometric oscillations ranging between 10 and 30 mm. Hg in amplitude (Fig. 1) indicating that the tubes are undergoing rhythmic contractions. By auscultation one can hear an intermittent tubal souffle in the lower abdomen in each hypogastric fossa or sometimes only in one. This does not mean that the other tube is necessarily closed; it may be due to the fact that the "silent" tube has a narrower uterine ostium or that it is hypertonic. When the patient sits up after the insufflation, for a brief minute or two she experiences pains in one or both shoulders. These pains can be promptly relieved by placing the patient in the Trendelenburg position for a few minutes; she is then able to go about her ordinary duties.

Tubal non-patency. Instead of dropping to or below 100 mm. Hg, the pressure rises to 200 mm. Hg, without exhibiting any oscillations and, when the gas flow is

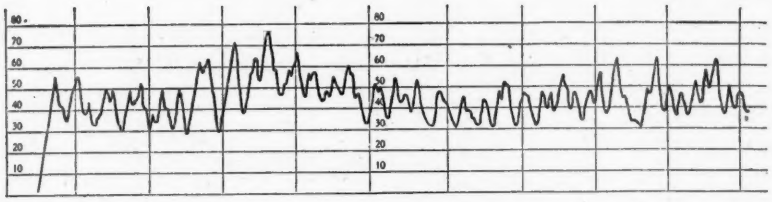


FIG. 1.

Rhythmic contractions in normal tubal patency with normal menstrual cycle. Note continuation of rhythmic contractions for 10 minutes. The patient was insufflated for 40 minutes in order to produce a large pneumoperitoneum. The contractions persisted throughout the insufflation.

stopped, a horizontal line is described on the kymograph (Fig. 2, facing p. 744). There are no pains in the shoulder because a subphrenic pneumoperitoneum has not been produced.

The carbon-dioxide is trapped within the Fallopian tubes at some point distal to the uterine openings or at the uterotubal junction (Fig. 2). The patient experiences temporary local pain during the insufflation, the character of which varies with the site of obstruction and whether the latter is symmetrical or asymmetrical. Careful notice of the pain-reaction affords diagnostic data as to the location of the site of obstruction. In general, when pain is suprapubic the obstruction is at the uterine ends of the tubes. When the pain radiates outwards the point of obstruction is located beyond the uterine ends, the wider radiation indicating greater proximity to the fimbria.

These points have been checked by X-ray-opaque media in hysterosalpingography (Fig. 2), by observations at laparotomy, and by experimental duplications of pathological conditions.

Partial stenosis. Obstructed Fallopian tubes which permit carbon dioxide to pass through them at points below 200 mm. Hg yield on uterotubal insufflation curves that differ from normally patent tubes and totally occluded tubes. The pressure in such cases rises to a point well above 100 mm. Hg and, instead of dropping sharply, declines in a gradual paraboloid fashion without exhibiting typical oscillations. These depend upon the degree of the stenosis and its cause, whether muscular inflammatory infiltration, or peritubal adhesions and kinking of the lumen. A subphrenic pneumoperitoneum is produced, resulting as a rule in symptoms referred to the shoulder. But in some cases the gas is trapped in the pelvis and fails to rise to the subphrenic space because of pelvic adhesions. When the tube lumen is not constricted but the tube is bound down for all or most of its length, the initial pressure is not necessarily high but there are at most, feeble, if any, manometric oscillations, i.e., tubal contractions are diminished in frequency and amplitude (Fig. 3).

It should be noted that if the abdomen is auscultated the souffle will be heard as a constant purring instead of being intermittent as is the case in normal patency.

Uterotubal spasm is characterized by a relatively high initial rise of pressure above 100 mm. Hg followed by a sharp drop, which is succeeded by rhythmic oscillations as in normal patency (Fig. 4). The spasm may be overcome at the first trial or the pressure may have to be maintained for a few seconds before the uterotubal sphincter relaxes, following which the gas

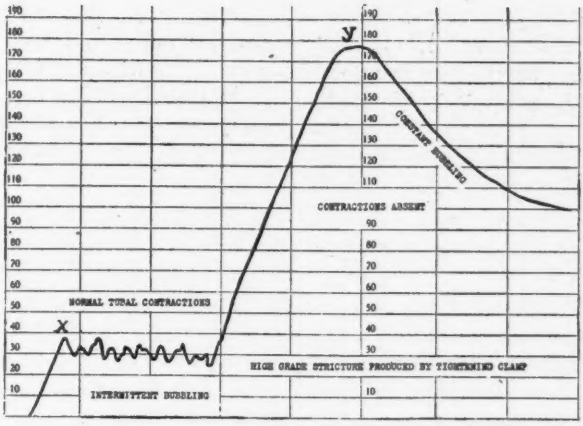


FIG. 3.

Showing the effect of constriction (stenosis) upon tubal contractility. Note pressure increase from 38 mm. Hg at *X*, to 178 mm. Hg at *Y*, after constriction and resultant abolition of contractions.

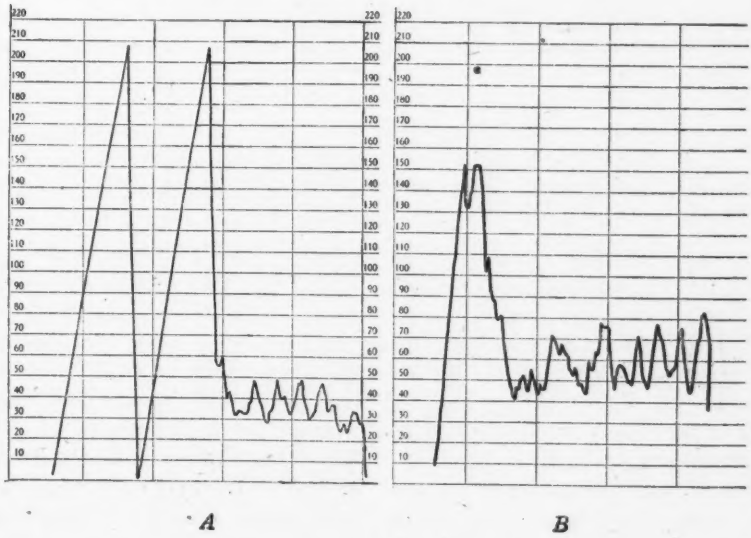


FIG. 4.

A, B. Two examples of uterotubal spasm.

passes through the tubes in a normal fashion. A subphrenic pneumoperitoneum and shoulder pains result in normal patency. The spasm may be overcome at once or the pressure may have to be maintained for a few seconds before the uterotubal sphincter relaxes, following which the gas passes through the tubes in a normal fashion. A subphrenic pneumoperitoneum and shoulder pains result as in normal patency.

A fifth condition is encountered in patent tubes whose musculature is atonic. The kymographic tracing is characteristic of prolonged primary and secondary amenorrhoea (Fig. 5). After artificial castration by X-rays and the natural menopause this atonic condition is most frequently met.

Peritubal adhesions and tubal stenosis. A clinical analysis of the findings with respect to the occurrence of peritubal adhesions and tubal stenosis showed the following: There were 538 cases of tubal adhesions or 16.75 per cent of the general group and 379 cases with permeable strictured tubes (11.84 per cent).

Uterotubal spasm. There were 97 cases out of 2,014 of the primary sterility group or 4.81 per cent; and 37, or 3.12 per cent of the 1,186 secondary sterility group. Antispasmodics of all descriptions have been used. The ideal pharmaceutical antispasmodic is not yet available. Luminal, transantin phenobarbital-syntropan, papaverine have seemed to be useful when administered for several days before insufflation. Amyl nitrite used immediately before the test has seemed to relax the spasm. Pelvic-abdominal diathermy immediately preceding the insufflation has also been found useful in some cases. By and large, insufflations alone done properly, without trauma or use of a cold cannula, the pressure being maintained for a minute or two in the obdurate cases, succeeds in overcoming spasm. As has been seen it is met in 1 out of 20 or 25 cases.

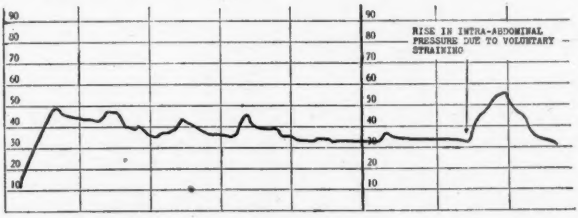


FIG. 5.

An example of low-tone, shallow contractions of Fallopian tubes in a case of prolonged secondary amenorrhoea. Note the rise in pressure due to voluntary straining.

The incidence of these conditions, as encountered in a personal series of 3,200 cases which were analyzed in 1937, are as follows: 814 or 40.41 per cent. of 2,014 cases of primary sterility had normal patency, and 396 or 33.39 per cent of 1,186 cases of secondary sterility could be classified within normal limits of patency.

Non-patency was encountered in the total series in 29.34 per cent, 536 cases of non-patency, or 26.61 per cent of the 2,014 primary sterility patients, and 403, or 33.98 per cent of the 1,186 secondary sterility cases.

The therapeutic possibilities of uterotubal insufflation were suggested by Ruben Peterson, who was one of the first of the

important gynaecologists to adopt this procedure. He was largely responsible for its popularity throughout the United States and I record this fact with sincere appreciation and réverence for his memory. Peterson employed transuterine pneumoperitoneum not only to diagnose tubal patency and non-patency but also for treatment of obstructed tubes, for the relief of dysmenorrhoea and to establish pneumoperitoneum for general diagnosis. Rongy was another of the early pioneers who advocated uterotubal insufflations for therapeutic purposes.

Although the question of how insufflation aids the sterile woman has engaged the interest of many workers since Peterson and Cron's first publication, an exact explanation cannot always be given. For the majority of successes the therapeutic action appears to be the following:

(1) It establishes patency of the genital tract from the external os of the cervix to the fimbriated ends of the Fallopian tubes. The cannula acts as a mechanical dilator in narrow cervical canals and insufflation sometimes dislodges a mucus plug and by clearing the canal permits a fortuitous ascent of spermatozoa.

(2) The same effects may be postulated for the Fallopian tubes in which inspissated mucus may be dislodged from a narrow to a wider area, agglutinated folds become separated and perifimbrial adhesions broken through. The last is probably the most likely.

(3) A possible psychosomatic effect cannot be ignored as sometimes, without encountering tubal obstruction, the mere performance of insufflation may serve as an intense emotional stimulus which relaxes the tubal and cervical sphincters on the one hand, while on the other possibly provoking ovulation in a manner analogous to that which takes place in some of the lower animals. There can be no question of a therapeutic result when the test, which is repeated once or several times with an improvement in tubal patency is followed shortly afterwards by pregnancy. The therapeutic results of uterotubal insufflation in cases where tubal obstruction was first encountered may be seen from the following table.

TABLE I.

	Number of cases	Number improved	Percentage
Tubal obstruction: maximum pressure 200 mm. Hg	939	185	19.70
Adherent and strictured tubes: maximum pressure 200 mm. Hg or less	917	238	25.95
Uterotubal spasm: maximum pressure up to 190 mm. Hg	134	15	11.19

Altogether, there were 438 patients whose Fallopian tubes showed improvement in patency on a second or third insufflation. Sixty-six (15.07 per cent) of these women became pregnant. It is noteworthy that 70 of the 238 patients with adherent and narrowed tubes showed a normal curve following insufflations. As Peterson has shown by experimental observations during laparotomy, closed tubes in the truest sense may be opened by employing sufficiently high pressures. In many of the other relatively closed or non-patent tubes it is possible to widen the strictured canal by more sustained pressures. From the therapeutic point of view this is of the greatest importance, as experience has repeatedly demonstrated.

From what has just been said it may be stated that within certain clinical and pathological limits practically all Fallopian tubes fall into 3 groups: (1) normally patent tubes, (2) non-patent tubes, (3) intermediary. With adequate pressures, group 2 may be advanced to groups 3 and

1, and group 3 may be more readily restored to group 1, i.e., normality. The extent to which some degree of patency can be produced by tubal insufflation will determine the conceptional possibilities in women whose sterility is traceable chiefly and exclusively to tubal pathology.

A brief analysis of 590 pregnancies which were preceded by uterotubal insufflation may serve to bring out pertinent facts. These pregnancies were reported voluntarily and I have no accurate information as to what eventuated in all of the 3,200 cases out of which number the 590 pregnancies were reported, as no systematic follow-up was carried out. The patients volunteered the information or transmitted it through another patient whom they were kind enough to recommend for similar treatment. For these reasons the percentages adduced cannot be accepted as definite. Furthermore it must be stated in this connexion that there is great difficulty in ascribing proper credit to any method calculated to relieve sterility unless all the circumstances connected with the case are fully available. I am also aware of the tendency to ascribe to any new method of treatment an occasional successful result in the sense of *post hoc ergo propter hoc*. In this group there are patients who became pregnant where the test had only the diagnostic value of determining tubal patency.

The cases have been analyzed from the view-point of the findings with uterotubal insufflation. Cases of primary as well as of secondary sterility have been included.

TABLE II.
Duration of Sterility (Primary and Secondary).

Years	Number	Percentage
1 to 3	285	48.31
3 to 5	162	27.46
5 to 10	127	21.53
10 to 15	14	2.37
15 to 20	2	0.33
Total	590	100.00

Comparison with the natural expectancy of conception. Coghlan has given statistical figures based on a large section of the population of Australia in which he analyzed the natural expectancy of pregnacy after marriage. This has served as the basis for comparison. After the 3rd year 3 times as many patients became pregnant as might be expected from the natural incidence. After 7 years the patients' chances are increased many fold by insufflation; and after 10 years, compared to Coghlan's estimates, insufflation appears to improve proportionately the chances of pregnancy. The 2 patients who became pregnant after having been sterile for 15 years show an incidence of 1 in 1,600 as against 1 in 20,000, according to Coghlan's figures. When it is considered that 34 of my patients were between the ages of 35 and 40 years, and 6 were over 40 years, the 40 pregnancies in this group may be accepted as due to therapeutic efforts rather than chance.

The tubal factor. Insufflation was the only treatment employed in 386 of the 590 patients who became pregnant (65.42 per cent). The therapeutic measures employed in the remaining 204 cases are too varied for evaluation.*

Table III shows that 46.44 per cent of the pregnancies occurred in women whose Fallopian tubes exhibited various degrees of impaired patency.

The incidence of pregnancy in the general sterility group according to the status of the tubes is shown in Table IV.*

The therapeutic effect of insufflation is particularly noteworthy in the 118 cases

* Nine hundred and thirty-nine of the 3,200 cases of sterility proved to have non-patent tubes and therefore are excluded from the statistics bearing on pregnancy.

TABLE III.

Tubal Status in 590 Patients who Became Pregnant

	Number	Percentage
Normal patency	316	53.56
Adherent tubes	135	22.88
Strictured tubes	118	20.00
Spasm and normal patency	21	3.56
Total	590	100.00

TABLE IV.

	No. of cases	No. of pregnant cases	Percentage
Normal patency	1210	316	26.12
Adherent tubes	538	135	25.09
Strictured tubes	379	118	31.13
Spasm and normal patency	134	21	15.74
Total	2261*	590	21.6

* See note on previous page.

of strictured tubes, for pregnancy was achieved in 31 per cent as against 26 per cent of the cases with normal tubal patency.

Use of the kymograph. The value of the kymograph in these cases cannot be overestimated. It has been used by me in conjunction with tubal insufflation since May 1925 and, particularly in connexion with prognosis and therapy, it affords appreciable aid. Of the 590 patients who became gravid, 544 were examined with the kymograph. Thanks to increased experience gained through the use of this instrument, is has been possible to repeat the test both with greater intelligence and more gratifying results. Forty-nine patients had been insufflated elsewhere.

Time of pregnancy in relation to insufflation. The time elapsing between insufflation and conception was noted. Data were available in 573 cases.

It is noteworthy that 158 women became pregnant within 1 month after insufflation, and 70 more within 2 months, making a total of 228 patients (38.64 per cent) who became pregnant within 2 months after insufflation. This short interval appears to be a fair criterion of the therapeutic value of the method. Many of these patients had been married or sterile 5 years and longer. Obviously the test cannot be held to have produced a remedial result when more than 2 regular menstrual periods have intervened between its use and conception except in cases where strictures were encountered. In cases where insufflation has demonstrated normal tubal patency, one can speak only of its diagnostic and prognostic value. The fact that 38 women became gravid in my series after an interval of 2 years or more following insufflation, should cause us to hesitate to give a hopeless prognosis for childbearing when

TABLE V.

Time of Pregnancy in Relation to Insufflation.

Number of pregnancies	Number of months after insufflation
158	1
70	2
37	3
38	4
35	5
40	6

378, or 64.07 per cent, of the pregnancies occurred within 6 months of the test; 108 pregnancies occurred within the second 6 months.

Number of pregnancies	Number of years after insufflation
49	2
15	3
9	4
5	5
3	6
3	7
2	8
1	10

In 17 cases the time interval was not recorded

the Fallopian tubes have been found patent or where they have been rendered patent.

Proof of therapeutic efficacy. If one judges results according to the rigid lines of the criteria for a therapeutic result we have 26 cases which have fulfilled all the requirements. These 26 cases were women who became pregnant within 1 month following this procedure. They were over 30 years of age, had been sterile for a period of over 5 years, had taken no contraceptive precautions for at least 1 year, and had resorted to no other treatment than insufflation. Excluding most of the other cases, there remain 66 in whom a therapeutic action on the part of insufflation is suggested because pregnancy followed upon improvement in the tubal status as a result of repeated insufflations.

In estimating therapeutic results or aetiological factors, the possibility of chance or accident, which must always be taken into account, was seriously considered. In smaller series than the present, chance may have undoubtedly played a large part as it most probably has in a number of my own cases. Ultimate results will naturally vary within certain limits, depending upon special groups of cases of sterility and upon the thoroughness with which treatment is carried out. The weight of evidence, all factors considered, points, in the larger series of eventuating pregnancies, to the fact that by relieving tubal obstruction uterotubal insufflation exerts a therapeutic influence in female sterility.

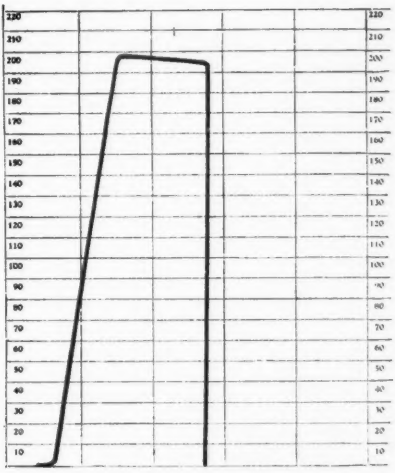
The therapeutic efficacy of uterotubal insufflation may be compared to the results of plastic procedures to restore tubal patency. The analysis of 818 plastic operations reported in reply to a questionnaire sent out by Greenhill is of particular interest in this connexion. There were 54 pregnancies, that is, 6.6 per cent, or 1 pregnancy out of 15 operations. Of these there were 8 ectopic pregnancies, 10 abortions, and 36 live babies, that is, 4.4 per cent successes, or 1 living baby out of 22.5 operations.

Of 438 patients, whose Fallopian tubes showed improvement in patency after a second or third insufflation, 66 became pregnant (15.07) which figure compares favourably with the results obtained after surgical intervention. When diathermy and other methods are added the percentage of success may be reasonably expected to increase as has actually been reported.

Tubal insufflation followed by lipiodol injection. In 7 of the successful cases with high-grade strictures, lipiodol was also employed. In 3 cases insufflation had been done once before lipiodol was employed, in 3 cases 3 times, and in 1 case 4 times. In 4 of these cases insufflation also followed the lipiodol injection, once in 2 cases, 4 times in 1 case, and 7 times in the other before pregnancy ensued.

The therapeutic efficacy of lipiodol in these 7 cases is difficult to appraise, because, altogether, 29 insufflations had been done before or after the 7 single lipiodol injections. I have had occasion to inject lipiodol in 159 patients, and pregnancy followed insufflation and lipiodol in these 7 patients alone. If we omit 99 cases of tubal closure and the 7 cases in which the examination was unsatisfactory, the incidence of pregnancy in the remaining 53 cases is 13.21 per cent. This is less than half the percentage of successes where insufflation alone was employed in the general group of patients having tubal strictures (31.13 per cent).

There are many other items which are of interest but which the limitations of time do not permit discussion. May I in conclusion recall the fact that we are here to consider the merits of uterotubal insufflation and hysterosalpingography. For the diagnosis of tubal patency and non-



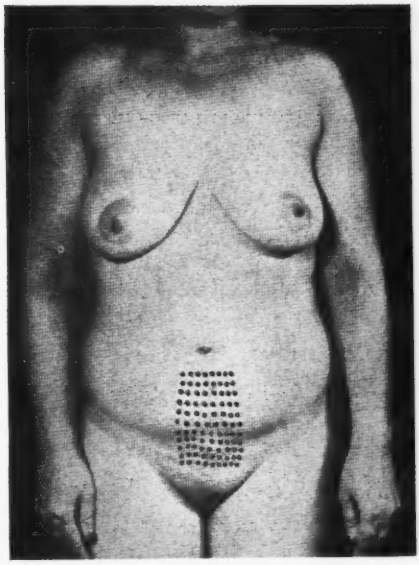


FIG. 2.

Uterotubal insufflation showing bilateral tubal obstruction accompanied by suprapubic pain and hyperaesthesia, indicating bilateral interstitial tubal obstruction. Hysterosalpingogram confirms these findings.

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patency the former has proved the method of choice. For the diagnosis of intrauterine pathology both in sterility and in general gynaecology, hysterography *per se* is invaluable. Its only competition is uteroscopy, which should perhaps be adopted more generally by gynaecologists. From the therapeutic side uterotubal insufflation aids the sterile woman who has partial tubal obstruction. The results exceed those of hysterosalpingography on the one hand and of surgical plastic procedures on the other. When other therapeutic, physical and hormonological adjuvants are added to uterotubal insufflation the salvage may be appreciably improved.

Studies in the Biology of the Cervix and its Relation to Puerperal Infections

BY

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PUERPERAL fever is a clinical entity which has long been recognized. The earliest known reference to the condition in medical literature was attributed to Hippocrates in the 5th century B.C. His teaching was that fever occurring during the first days of the puerperium was due to suppression of the lochia. His influence on subsequent medical thought was of enormous consequence and about 1,500 years passed before his conclusions were seriously questioned.

William Harvey in 1651, stated that "foul and putrid lochia sets up fever and other violent symptoms." He considered the raw placental site as a "vast ulcer" and stated "If any part of the placenta adhere to the uterus the lochial discharges become foetid, green and putrid." These views were a great advance in the study of the aetiology of puerperal infection.

Charles White, of Manchester, in 1773, stated that he thought puerperal fever and surgical fever were similar, and he advocated postural drainage, isolation of infected cases and rigorous cleanliness in combating puerperal fever. His results were so good that many continental teachers visited his clinic, among them Boer of Vienna, who applied White's teaching in his own clinic.

In 1789, Baudelocque suggested that the introduction of the hand into the parturient canal and the use of instruments were factors in the aetiology of puerperal infection, and in 1795 Alexander Gordon stated that puerperal infection "seized women only as were visited or delivered by a practitioner, or taken care of by a nurse, who had previously attended patients affected with the disease."

In 1847, Semmelweis noted a high mortality from puerperal fever among women confined by students who attended post-mortem examinations as compared with a low mortality among women confined by midwives, and concluded that the disease was due to contamination. He reintroduced the principles of White and insisted on the attendants washing their hands in lime water before confining the patients. Later he stated that though infection may be conveyed to the woman by her attendants she may also infect herself owing to retention in the birth tract of material which had undergone decomposition.

In 1879, Pasteur demonstrated the presence of streptococci in the lochia of a woman who died of puerperal fever, and for some time this organism was considered the sole cause of the disease.

In 1883, Ahlfeld revived the problem of autoinfection. He postulated that it was possible that "pathogenic organisms may

exist in the genital tract during pregnancy without giving rise to symptoms, and that they only exert their influence during labour or the puerperium when the wounds which follow labour will afford abundant opportunity for their absorption." Döderlein, in 1887, and Winter, in 1888, found varieties of pyogenic organisms in the vagina and cervix of non-pregnant women (Peckham, 1935; Galloway, 1945).

Harris and Brown (1929) reviewed 113 cases of streptococcal puerperal infection, and concluded that puerperal infection due to aerobic β-haemolytic streptococci were almost invariably exogenous in origin, while γ-non-haemolytic streptococci were usually the cause of endogenous puerperal infections.

Leonard Colebrook (1930) reviewed the position of the streptococcal organisms causing puerperal infections and stated that strictly anaerobic streptococci had been isolated from the blood of a number of cases of puerperal fever and that similar organisms had been found in the vagina during pregnancy. He isolated anaerobic streptococci from the blood of 17 patients with puerperal fever and found in 8 cases the blood culture gave a mixed growth, two types of anaerobic streptococci or anaerobic streptococci and some other organism. The incidence was such that a contagious origin of the infection was unlikely, 10 cases had undergone intra-uterine manipulations during labour. There was a mortality of 39 per cent.

Meleney (1931) discussed the possibility of the adjuvant action of organisms found together in certain disease processes and concluded that the "synergistic action of such bacteria should always be kept in mind in studying disease processes involving tissues, organs, or systems in which mixtures of organisms are frequently or occasionally found."

Douglas and Davis (1946) obtained cultures from uteri in 1,000 patients with puerperal infection. They reported that the majority of organisms found in these cases were also frequently found in the lower genital tract in the pregnant and non-pregnant woman, and considered that these cases represented autogenous infection. They stated that "endogenous infections constitute by far the largest group encountered and also the most difficult to control." They also suggested that the process of infection commenced with the onset of labour, in the great majority of patients labour terminated before clinical signs of infection developed, and that the development of intrapartum infection did not imply that the postpartum course would be febrile or that the patient would be classified as having morbidity by any of the standards commonly employed. They concluded that the incidence of endogenous infections may be decreased by control and restoration of blood loss, limitation and timing of operative procedures, removal of retained portions of placenta at the end of the third stage of labour, early repair of lacerations with proper surgical asepsis and control of intercurrent disease. It will be noted that they emphasized morbidity which may not become manifest till the lying-in period is well over.

Hite, Hesseltine and Goldstein (1947) studied cultures taken from a series of 248 normal and pathological obstetrical and gynaecological patients. They found that the variety of bacteria and the type of bacterial flora were not very different in cultures taken from the postpartum intrauterine cavity of normal and infected patients and from the vagina in trichomoniasis. They stressed the fact that the patients suffered from mild and localized infections and in considering the diversity of bacteria present suggested that there is a probability of synergistic infection. Further they found that the bacterial flora

of the vagina in normal pregnant patients resembled that found in patients with monilial and non-specific vaginitis. The organisms found were grouped as aerobes and anaerobes. The former included *Staphylococcus albus* and *S. aureus*, streptococcus alpha type, haemolytic and gamma type, diphtheroid rods, coliform rods, fungi and aciduric rods. The anaerobes were grouped as facultative, being streptococci and strict anaerobes which included streptococci, micrococci, diplococci, *Bacillus necrophorum*, *B. melaninogenicum*, fusiforms and other bacteroids. It is noteworthy that these authors have investigated conditions likely to cause morbidity rather than conditions likely to lead to mortality.

The role of the vagina and the changes which it undergoes during menstruation and pregnancy have been studied. Papanicolaou (1933) studied the cytology of smears made from fluid withdrawn by a pipette from the vagina at different stages of the menstrual cycle and described the rhythmic changes occurring.

Cruickshank and Sharman (1934) studied the vaginal epithelium at different ages and under different conditions together with the bacterial flora and vaginal pH. They found that the pH became more acid when glycogen was found in the vaginal epithelium and considered the conditions then present as unfavourable for the growth of pathogenic organisms. They specifically noted a great increase in glycogen in the vaginal epithelium in pregnancy and considered that an increase in oestrin was responsible for it; the mechanism being an attempt to kill any pathogenic organisms present or likely to be introduced into the vagina.

An increase in thickness of the vaginal epithelium in pregnancy in Rhesus monkeys was noted by Davis and Hartman (1935), and similar changes were found in women by Davis and Pearl (1938) as well as postpartum involutional changes. They considered that oestrin causes marked proliferation of the vaginal epithelium with deposition of glycogen and the latter authors postulate that one of the functions of vaginal acidity is to guard against infection of the genital tract during pregnancy, labour and the puerperium.

The role of the cervix as a possible source of puerperal infections has not been studied extensively. Frost (1939) reported a series of 30 patients with cervical erosions and pregnancy. He treated these women by electro-coagulation lightly, searing the portio vaginalis cervicis only and found that healing occurred in 4 to 8 weeks, labour was not prolonged and no patient miscarried. He undertook the treatment because he believed that the inflammatory and infectious process would spread and possibly cause salpingitis, metritis or even pelvic peritonitis. However, he does not appear to have studied the lesions and their progress during pregnancy.

The changes in the cervical mucosa occurring during the menstrual cycle were studied by Woollner (1936, 1937). He described changes occurring in the surface cells, in the glands and in the stroma. After menstruation the surface cells are low columnar with little cytoplasm; as the cycle proceeds these cells become tall columnar, densely crowded and bulging with secretion; during menstruation they are shed and repair occurs from the broken ends of glands. The stroma after menstruation consists of dense fibrous tissue with widely spaced cells whose nuclei almost fill the cells, blood vessels are collapsed. Gradually there is an increase in the number of cells and the stroma becomes oedematous, the cells are larger and blood-vessels engorged till during menstruation haemorrhages occur. The glands after menstruation are scanty, widely scattered

and tubular, lined by low columnar cells. Gradually the glands increase in size and number and become crowded and branching. The cells become high columnar and bulge into the lumen and there is evidence of secretion. During menstruation there occurs extensive destruction and exfoliation of the epithelial elements, some glands being entirely denuded of epithelium. Glycogen was found in all stages of the cycle, in the stroma constantly, but was found in the cytoplasm of the epithelium only just before menstruation. Woollner (1939) also studied the effect of hormones on the cervical mucous membrane and concluded that oestrin alone caused proliferation of columnar epithelium, oedema of the stroma and distended blood-vessels; luteal hormone alone did not affect the gland elements but stimulated the squamous cells which proliferated and invaded the cervical canal. Finally when both hormones were given together both elements were stimulated, the glands becoming racemose with tall columnar cells and the stratified epithelium projecting into the stroma while the superficial layers showed vacuolation and parakeratosis.

Barton and Wiesner (1945) studied changes in the cervical mucus during the menstrual cycle. They state that during the ovulatory phase the secretion is clear, colourless and viscid and while the exterior is acid from contact with the vaginal flora the interior of the cordon of mucus is alkaline. During the luteal phase the flow diminishes in quantity and becomes opaque while remaining viscid and alkaline. This opacity is due to desquamated cervical cells and leucocytes which appear in increasing numbers as the menstrual cycle enters the second phase. These desquamated cells and leucocytes are found in the endocervix of healthy fertile women. They consider that this mucus forms a barrier through which only healthy sperms can penetrate. Infertile women whose cervix is at fault can be grouped as women with " dry " cervices, women with atypical mucus—often a thick plug of mucus—and patients with frank endocervicitis.

Petrowa and Berkowskaja (1935) studied sections of the cervix in 13 patients who underwent operation at varying times from $3\frac{1}{2}$ to 8 months' pregnancy; 6 were primigravidae and 7 multiparae. Further sections were studied from 2 cervices removed during parturition and 4 cervices during the puerperium. They found that the glands and stroma underwent profound changes during pregnancy and parturition, the glands undergoing increasing proliferation, hypersecretion and dilatation as the pregnancy advanced. They noted that squamous metaplasia of the surface and glandular epithelium occurred in 8 cases. The stroma retained its youthful character during pregnancy, the cells being often of a decidual nature and at times a genuine decidual focal reaction was seen. Further they observed that in 1 case of hydatidiform mole the changes were more pronounced. They found an almost complete shedding of the cervical mucosa in the cervices of the 2 parturients in their series. These patients had hysterectomy performed for ruptured uterus and it is permissible to wonder what interference had occurred before operation was performed, causing damage to the cervical mucosa. Finally they found regeneration of the mucous membrane of the cervix uteri and the restoration of the secretory function of the glands accomplished in the first 10 days of the puerperium. They considered the cervical mucosa was restored to its original thickness in 4 to 6 weeks postpartum.

Levey (1936) reviewed the literature and gave a summary of changes occurring in the cervix uteri during pregnancy. He stated that the glands underwent marked

hyperplasia and hypertrophy, they were very active and underwent many transformations — corkscrew-shape, dilatation, contortion and some undergo cystic changes. The glands grow down and outward often in papillary projections. The epithelial cells may be tall columnar, some are full of mucus. In other areas there may be reduplication of the epithelial cells leading to a double layer of cells. During the 8th month the cervix appears to be almost one mass of mucous tissue extending to the muscle layer. Mucus production occurs about the beginning of pregnancy and is very marked at the 3rd month, the mucus often containing round cells and plasma cells. The stroma becomes loose and spongy and the cells appear younger and are clear and swollen. Numerous capillaries are present in the loosely arranged connective tissue which is much diminished in amount and at term only a few delicate supporting fibres are to be seen.

Hofbauer (1933) examined 29 specimens of gravid uteri and noted a variety of epithelial changes. In the majority the changes observed were reduplication of cell layers, vacuole formation and polymorphism of the nuclei. In 8 cases, however, epithelial proliferation with stratification, occurrence of mitotic figures, epithelial down-growth into the connective tissue and goblet-cell formation were noted. He suggested that these changes might represent an important link in the chain of factors causing later epithelial variations and possibly carcinoma.

The work of several investigators (Overholser and Allen, 1935; Hisaw and Lendrum, 1936; Korenchevsky and Hall, 1937, 1938) suggests that metaplastic changes in the cervix uteri may be due to oestrin stimulation and Woollner (1939) and Bourne and Williams (1945) believe that cervical "erosions" are of hormonal origin.

No attempts seem to have been made to study changes in the healthy and diseased cervix during pregnancy and postpartum, nor to assess the part played by pathological conditions of the cervix in causing morbidity during the puerperium. While every clinician is familiar with the story of symptoms of pelvic inflammation "ever since my last baby," there are many gaps in our knowledge of the mechanism by which such spread of inflammation occurs.

The present investigation was undertaken in an endeavour to discover if cervical lesions present during pregnancy were caused by or harboured organisms which could spread into the tissues during labour and the puerperium and be responsible for the low-grade infections so frequently seen in women who have borne children.

Material Studied.

The work was undertaken in the outpatient department of King George V Memorial Hospital for Mothers and Babies. The patients were referred to the Leucorrhoea Clinic for observation and treatment. Twelve normal patients were investigated; to eliminate any traumatic or infective factor, only primiparae were included. Another series of cases in which the cervix did not appear entirely normal but whose variations did not seem very excessive were classified as "For Observation". They had originally been referred to as "Normals". In this group there were 7 cases. The abnormal patients were grouped as primigravidae, of which there were 37, and multiparae, of which there were 21. It was thought important to study effects of trauma apart from other factors.

Technique Employed.

Each control patient was investigated as soon as possible after pregnancy was estab-

lished. The patients complaining of discharge were investigated as soon as referred to the clinic. The patient was placed in the dorsal position with the knees drawn up and separated. Smears and cultures were collected from the urethra. Then a sterile bivalve-speculum was introduced into the vagina and the cervix and vault exposed. Smears and cultures were taken from the cervix and vaginal vaults. Any collection of pus or matter in the vagina was specially investigated.

In a certain number of cases a sterile swab-stick was rubbed over the vagina and a second over the endocervical canal. The swab-sticks were then gently rolled over 2 glass slides which were exposed to iodine vapour. The slides were then examined, and in all the vaginal smears epithelial cells staining a mahogany colour indicating the presence of glycogen were seen. No such finding was made in the cervical smears. The procedure was very tedious and as it was felt that insufficient knowledge was obtained from a time-consuming practice, it was dropped.

A swab-stick was passed into the cervical canal, then placed in a drop of saline on a palette, and a drop of universal indicator was then added. The resulting colour gave the reading for the cervical pH. The vagina was next washed out with saline, the washings kept for bacteriological study and one drop added to a drop of universal indicator on a palette. The colour-change gave the readings for the vaginal pH.

The vagina was then swabbed out and a biopsy taken from the cervix. At first an attempt was made to curette the cervical canal, but the endo-cervix appears to be too firmly fixed to the underlying tissue for this method to be successful. A change of instrument gave more satisfactory results. A laryngeal punch forceps was used and an attempt made to obtain a specimen from the muco-squamous junction so that the orientation would be easy for the microscopist.

One factor arose in connection with the collection and interpretation of the biopsies that deserves special mention. Collection of suitable biopsy material from normal cases was much more difficult than from abnormal cases. This seems to be a very important point. The external os is more tightly closed in normal cervices than in the pathological cervices.

At subsequent visits the cervix was again inspected and biopsies taken at monthly intervals in normal cases. Care was taken to use a fresh area of cervix at each visit to prevent any spoiling of the microscopic picture with healing phenomena. If it was necessary further investigations were done, such as cultures, collection of saline washings or catheter specimens of urine. Sugar-tolerance tests were also undertaken in patients harbouring monilia or complaining of vulval irritation.

Repeated biopsies were taken in abnormal cases as often as was felt advisable. An endeavour was made in all groups of cases to take biopsies as soon as possible after the confinement and a further biopsy was then taken just prior to discharge. The patients were requested to return at 6 to 8 weeks postpartum and again at 3 months postpartum, when further biopsies were taken. If it was found impossible for the patients to attend they were asked for a report on their condition.

Findings at the First Visit and Biopsy Studies.

A—Normal Cases.

The 12 cases studied proved to have findings similar in most respects to those described as normal in other countries. The age distribution is as follows: only 1 patient was over 30 years; the other 11 were in the 20 to 30 years age group. The pH

findings are tabulated in Table I, and are quite in accordance with other findings. The findings seen in the smears are included in Table II. It will be noted that there were few polymorphs or organisms found in any site in the normal cases. The organisms found are tabulated in Table III. Two patients had monilia present in the genital passages, but they did not develop vaginitis and did not complain of irritation and may therefore be considered as carriers. One patient complained of irritation at the 14th week. A sugar-tolerance test revealed a normal blood-sugar curve, but she leaked sugar from the kidney and when she was put on a reduced carbohydrate diet the irritation ceased and she had no further trouble. The macroscopic appearance of the cervix did not alter very much during pregnancy. As the patient entered the 3rd trimester there was often some transudate in the vagina and a small amount of mucus in the os. Two patients had a little heaping of endocervical epithelium protruding through the os, and in 1 case the cervix was patulous at term.

TABLE I.
Comparison of pH Findings.

Site	pH	Normal Total 12	Observation Total 7	Abnormal primigravidae Total 37	Abnormal multiparae Total 21
Vagina	4	6	5	13	5
	5	4	2	8	8
	6	1	—	3	3
	Bleeding	—	—	7	1
	Not recorded	3	—	6	3
Cervix	6	1	—	1	1
	7	1	4	3	4
	8	7	3	21	10
	Bleeding	—	—	8	1
	Not recorded	4	—	5	5

Biopsy Findings.

All these biopsies were stained with haematoxylineosin.

During pregnancy the endocervical mucosa and the portio vaginalis undergo profound changes. The earliest change is thickening of the squamous epithelium. Decidual change in the stroma can appear as early as 10 weeks. The glands begin to increase in size and number at about 4 to 5 months. At this period there is evidence of secretion and slight hyperplasia of the epithelial cells. At 5 to 6 months the stroma shows a marked increase in vascularity and oedema begins to appear. Goblet-like cells were noticed for the first time, also a syncytial-like arrangement of epithelial cells. At 6 to 7 months the squamous epithelium begins to thin and the stroma decreases in amount, its place being taken by the increase in glands. Squamous metaplasia was noted for the first time at this period. Secretion and hyperplasia are very marked features. The glands assume many shapes—racemose, elongated, dilated and filled with secretion. Nabothian follicles were seen for the first time at this period. These changes progressed to term and in all these cases inflammatory cells did not present a marked feature. When present they were confined to the tips of papillae, the muco-squamous junction, the lumina of glands or Nabothian follicles or mucus bathing the tissues.

TABLE II.
Comparison of Smears.

Site whence taken	Cell type	Number	Normal cases Total 12	Observation cases Total 7	Abnormal primigravidae Total 37	Abnormal multiparae Total 21
Vagina	Epithelial cells	Profuse	—	—	2	—
		Numerous	5	4	20	16
		Moderate	6	2	10	5
		Few	—	1	5	—
		None	1	—	—	—
	Polymorphs	Profuse	—	—	2	—
		Numerous	—	—	9	10
		Moderate	—	—	6	4
		Few	8	7	19	6
		None	4	—	1	1
	Organisms	Profuse	1	2	10	10
		Numerous	5	3	17	10
		Moderate	2	2	7	1
		Few	3	—	2	—
		None	1	—	1	—
Urethra	Epithelial cells	Profuse	—	—	—	—
		Numerous	4	3	13	12
		Moderate	5	4	16	5
		Few	2	—	7	4
		None	1	—	1	—
	Polymorphs	Profuse	—	—	—	—
		Numerous	—	—	—	1
		Moderate	—	—	6	—
		Few	6	3	22	14
		None	6	4	13	6
	Organisms	Profuse	—	—	—	—
		Numerous	—	1	9	4
		Moderate	1	2	15	8
		Few	6	2	1	7
		None	4	2	3	2
Cervix	Epithelial cells	Profuse	—	—	—	—
		Numerous	3	2	4	6
		Moderate	3	3	14	5
		Few	6	2	19	10
		None	—	—	1	—
	Polymorphs	Profuse	—	1	—	1
		Numerous	1	4	19	9
		Moderate	3	2	13	6
		Few	6	—	5	5
		None	2	—	—	—
	Organisms	Profuse	—	—	5	3
		Numerous	1	2	13	6
		Moderate	3	—	11	2
		Few	5	5	7	9
		None	3	—	1	1

TABLE III.

Comparison of Cultures

Organisms	Normal primiparae Total 12			Observation primiparae Total 7			Abnormal primigravidae Total 37			Abnormal multiparae Total 21		
	Cervix	Urethra	Vagina	Cervix	Urethra	Vagina	Cervix	Urethra	Vagina	Cervix	Urethra	Vagina
Non-haemolytic streptococcus	4	2	4	4	3	5	15	15	19	8	8	9
Staphylococcus albus	4	4	3	–	2	1	7	10	8	1	6	4
Bacillus coli	–	–	–	–	–	–	1	3	2	–	–	–
Monilia	2	2	1	1	1	1	8	10	11	9	11	11
Staphylococcus aureus	–	–	–	–	–	–	1	1	1	–	–	–
Bacillus proteus	–	–	1	–	–	–	–	–	–	–	–	–
Diphtheroids	2	3	2	–	–	–	2	5	5	1	1	1
Döderlein's bacillus	1	–	2	–	–	1	2	2	2	2	3	3
No growth	4	4	3	3	2	–	11	10	5	5	4	3
Trichomonas vaginalis	–	–	–	–	–	–	–	–	1	–	–	1

It is perhaps worthy of notice that one patient had fibrous stroma and very few glands right up to term. It was considered possible that her confinement would be long and when she did come into labour she had an instrumental delivery after 74½ hours and her cervix was badly lacerated. The above conclusions are drawn from the following data. In the 12 patients there were 8 biopsies collected under 10 weeks' cyesis. Of these 4 were unsatisfactory. The other 4 cases showed a thickened squamous epithelium. In 3 cases the stroma was of an adult, non-pregnant type; in 1 case there was a patch of decidual reaction. The endocervical epithelium was of columnar type, not secreting and inactive. A few glands were noted in 1 case only. No inflammatory cells were noted.

At 3 to 4 months' cyesis 5 biopsies were unsatisfactory. In the remaining 7 cases the squamous epithelium was thickened, the stroma became more vascular in 3 cases and slightly more oedematous in 4 cases. In 2 cases it remained fibrous. The endocervical epithelium was obtained in 4 cases. In these cases the epithelial cells were increasing in height, there was a little evidence of secretion. In 1 case there were a few low papillae. In 1 a few glands of tubular type were beginning to appear. In 1 case only were a few leucocytes noted at the mucosquamous junction.

At 4 to 5 months' cyesis, only 1 biopsy was unsatisfactory. In all the 11 remaining cases the squamous epithelium was thickened. The stroma varied. In some cases there was definite evidence of oedema and increasing vascularity. In 3 others the stroma remained fibrous but showed evidence of increased vascularity. In 4 cases the endocervical mucosa was completely missed. In 2 cases there was a very marked increase in the number of glands. The surface epithelium as well as the glandular epithelium became taller and showed evidence of increasing hyperplasia and secretory activity. In these 2 cases inflammatory cells were seen, numerous in 1 case, a few only in the other. In the remaining 6 cases the surface epithelium was showing evidence of hyperplasia, some reduplication of cells occurred and there were signs of secretion. The glands, while

not numerous, were beginning to increase in size and number. In 2 cases only were a few inflammatory cells noted at the mucosquamous junction.

At 5 to 6 months' cyesis, in 8 cases the squamous epithelium was thickened and in 2 cases it was not seen, in the remaining 2 cases it was only a thin strip. The stroma was fibrous in 3 cases, in 1 case there was a patch of decidual reaction. In the remaining 8 cases the stroma was becoming vascular and oedematous, the dilatation of vessels being the most noticeable feature. In 4 cases the endocervical mucosa was missed. In all the other cases the glands were increasing in number and like the surface epithelium showed evidence of commencing hyperplasia and secretion. Three patients had Nabothian follicles. Goblet-like cells were seen in 2 cases. In 1 case there was a syncytial-like arrangement of epithelial cells. Inflammatory cells were seen in 3 cases; a moderate number around the glands and in follicles in 2 cases, and a few at the mucosquamous junction in 2 cases. No inflammatory cells were seen in 4 cases.

At 6 to 7 months cyesis the squamous epithelium was thickened in 8 cases. In 2 cases it was not seen and was thin in 2 cases. The stroma in 1 case remained fibrous. In all the others it was vascular and oedematous, in 2 cases it was very scanty, being largely replaced by the epithelial elements. The endocervical epithelium was not obtained in 4 cases. Squamous metaplasia was noted in 3 cases. In the other cases the surface epithelium was secreting actively, there was reduplication of the epithelial cells which were very hyperplastic and which were showing evidence of great secretory activity. Nabothian follicles were observed in 3 cases. Some glands were racemose, others elongated; goblet-like cells were noted in 1 biopsy. Inflammatory cells were not seen in 4 cases. In the remaining 4 cases there were a few leucocytes, both polymorphs and round cells scattered in glands, mucus and at the mucosquamous junction.

At 7 to 8 months' cyesis biopsies were not obtained in 2 cases. In the other 10 cases the squamous epithelium was missed once, was beginning to thin in 2 cases and was thick in the remaining 7 cases. The stroma was vascular, oedematous and scanty in 9 cases, it was fibrous in 1 case. Endocervical tissue was missed in 2 cases. In all the remaining cases the epithelium was very active, marked secretion and hypoplasia occurring, numerous goblet-like cells were seen. Metaplasia was observed twice. Glands were numerous except in 1 case and Nabothian follicles were noted twice. The glands were of many shapes, some racemose, some dilated and some elongated. Inflammatory cells were noticed only once in any marked degree and then they were present in mucus and not in the tissue.

At 8 to 9 months' cyesis biopsies were not obtained in 4 cases. The squamous epithelium was not seen 3 times; it was thin in 2 cases but of the usual pregnancy thickness in 3 cases. In all but 1 case where it was fibrous, the stroma was vascular, oedematous and very scanty. Surface epithelium could only be identified in 4 cases, in 2 of which there was squamous metaplasia. Elsewhere the cells were tall columnar, and actively secreting with goblet cells present, except in 2 cases where secretion was not a marked feature. Glands were a marked feature except in 3 cases. As a rule the tissue looked somewhat spongy and compressible. In 6, no inflammatory cells were seen. In 1 case the distribution was patchy. In 2 cases they were widespread in mucus, at the mucosquamous junction and in the gland lumina.

One biopsy was taken at term. In this specimen no squamous epithelium was

observed. The stroma was vascular and oedematous, and there was a patch of decidual reaction. The glands were racemose and the epithelium continuous with the surface epithelium showed advanced metaplasia, was actively secreting and goblet-like cells were present. No inflammatory cells were seen.

Postpartum Biopsies.

Conclusions are difficult to draw from these biopsies as trauma and interference cannot be eliminated, but it would appear that the greater part of the endocervical mucosa is shed during or immediately after parturition. The stroma begins to become much more cellular and to increase in amount. The cells are at first rounded and become crowded together. Later they become spindled-shaped. The vessels become collapsed and, about the 10th to 14th day, perivascular thickening can be observed. The endocervical mucosa begins to regenerate early, about the 7th day, and reaches a considerably advanced stage by the 14th day. Glands are a variable feature: scanty in some cases, of adenomatous or follicular proportions in others. Metaplasia is a marked feature in nearly half the cases. Inflammatory cells were also variable being present in 9 cases and numerous in 4 cases. They do not appear to be related to trauma, pyrexia or interference.

The basis for the above statement is to be found in the following facts.

Four biopsies were taken within 16 hours of the end of labour. They were all taken from patients who had normal deliveries. Only 1 of these patients had an apyrexial puerperium. The squamous epithelium was thin in 2 cases, missing in 1 and thick in the last. The stroma was oedematous and vascular in all cases, in 2 there was evidence of increase in the number of connective tissue cells which were rounded. There was some pink-staining amorphous material around the vessels in 1 biopsy. Glands were not a prominent feature, their number had decreased and there was no evidence of secretion. Squamous metaplasia was seen in 1 biopsy. Inflammatory cells were widely scattered in 2 cases, 1 of which was pyrexial, the other apyrexial. Few or none were seen in the other 2 cases, both of which had mild pyrexia.

Biopsies were taken from all 12 patients between 7 to 14 days postpartum. One of these was unsatisfactory. The squamous epithelium was missing in 2 cases and was only a thin strip in 3 cases. In the remaining 7 cases it was thick. The stroma showed very great changes. In all cases it had increased in amount and had become much more cellular, the cells being round cells crowded together. In 1 biopsy taken on the 7th day these connective tissue cells were becoming spindle-shaped, but as a rule this change did not occur till the 11th to the 14th day. Perivascular thickening was noted in 4 cases, the earliest day being the 7th. One case where the cervix had been lacerated extravasated blood was undergoing organization on the 9th day. The endocervical mucosa showed various features. It was missed in 2 cases, in 2 only a few broken glands were observed. Papillae were observed in 2 cases, in 1 of which no glands were seen. Few glands of tubular shape were seen in 2 cases. In 5 biopsies the glands were numerous, sometimes racemose, sometimes dilated, on one occasion forming small adenomatous clumps. Metaplasia was observed in 5 biopsies and secretory activity only twice on the 10th and 14th day of the puerperium. Inflammatory cells were a variable feature. They were noted in considerable numbers on 4 occasions, a few only 5 times. In 1 biopsy there was none. There was no relation

between trauma, interference or pyrexia, and the number of leucocytes present.

Biopsies Taken at Return Visits.

The changes which occur in the cervical mucosa during the puerperium appear to continue and reach their maximum about the 3rd month postpartum. Metaplasia was still present and the endocervical elements had reached a resting phase or had formed what amounted to an erosion although this was only evident clinically in 1 case and it was only in this case that inflammatory cells were a marked feature, elsewhere their distribution was patchy and their number small. The stroma had increased in amount and was cellular. Some signs of perivascular thickening persisted. The squamous epithelium had returned to its resting state.

These conclusions were drawn from analysis of the following facts. Biopsies were taken from 8 patients, 5 biopsies were taken 2 months postpartum. The squamous epithelium was missed in 2 cases, cut on the skew in 1 and of pre-pregnancy thickness in the other 2 cases. The stroma was increased in all with some round spindle-shaped cells usually crowded together. One biopsy showed marked perivascular thickening. In 2 cases there were few glands continuous with the surface epithelium and secretion was not observed. In 2 other cases the glands were racemose or tubular and fairly numerous, there was no secretory activity, 1 had advanced metaplasia widespread in glands and on the surface. The remaining case developed an erosion and salpingitis. Here there was very marked secretory activity, goblet-like cells were observed and marked metaplasia. Except in this last case inflammatory cells were not a marked feature.

There were 6 biopsies collected 3 months' postpartum. Of these 1 was unsatisfactory. The squamous epithelium was missed twice. In the others it was somewhat thicker than in the resting state. The stroma had increased in amount and was very cellular in all. There were patches of oedema in papillary tips. In 1 case no glands were seen but in all the others the glands had increased in number and were racemose and continuous with low papillae. The cells were columnar and often the growth was so marked that the microscopic picture suggested a mixed papillary and follicular erosion. In the case that developed a clinical erosion and salpingitis there was very marked secretion. Metaplasia was observed once. Inflammatory cells were either scanty or not observed.

Two biopsies were taken at 4 months' postpartum. There were no changes from the features described under 3 months' postpartum findings.

One biopsy was taken at 6½ months postpartum. In this case the squamous epithelium was missed, there was a moderate amount of stroma which was very cellular and was slightly vascular. There were numerous elongated glands continuous with papillae forming an erosion. The cells were tall columnar and there was slight secretory activity. No inflammatory cells were seen.

B—Observation Cases.

The next group to be studied are the 7 cases referred to the clinic as normal. The appearance of the cervix at their first attendance, however, showed a variation from the strict standards adopted while not being definitely pathological. They were, therefore, classified as " For observation ". The age-distribution of all the group was between 21 and 30 years. The pH findings are seen in Table I, and show no deviation from those seen in the normal cases. The findings seen in the smears are included in Table II. Here again the results agree

with those seen in normal cases. The organisms found are tabled in Table III. There was 1 patient with monilia at the first visit. She developed a mild vaginitis which was readily controlled. A second patient developed monilia during her pregnancy at 4 months, which also yielded readily to treatment. Sugar-tolerance tests were done on both these patients. Both had a glycosuria but a normal sugar-curve. A reduced carbohydrate diet helped to control the condition. The appearance of the cervix at the first visit of these patients is as follows: 2 had appearances suggestive of early erosion, 3 had a reddening around the cervical os and 3 had some slight mucoid discharge.

Progress During Pregnancy.

The 2 patients who developed a monilial vaginitis had a slight mucoid discharge during the entire pregnancy and both had at first visit a fine white veil over the vagina. One developed a small erosion about $\frac{1}{4}$ inch in diameter around the os. This yielded readily to 4 applications of penicillin-sulphanilamide powder given twice weekly. The other patient developed definite cheesy deposits in the vaginal vault. Her cervix remained quiescent. The monilial vaginitis yielded to 4 applications of penicillin-sulphanilamide powder. Two of the patients had reddening around the cervix and mucoid discharge. The lesion did not advance but Nabothian follicles developed during the pregnancy at 24 weeks in 1 case. The remaining 3 cases all developed erosions. In 1 the erosion appeared about $\frac{3}{4}$ inch diameter at 15 weeks, in the 2nd the erosion appeared about $\frac{1}{2}$ inch in diameter at 19 weeks and in the 3rd an erosion about 1 inch in diameter appeared at term.

Antepartum Biopsies.

There is a decided change in the pattern of development exhibited in these biopsies during the course of pregnancy. The squamous epithelium and stroma show the same features. The difference is in the glands. It is also noteworthy that these biopsies were easier to collect and there were fewer failures—3 only—to obtain suitable material. As early as 3 to 4 months cyesis there were papillae and numerous glands present. In 2 cases they were grouped together in adenomatous-like masses. Secretory activity was already obvious in 4 cases. Squamous metaplasia was observed in 1 case.

At 4 to 5 months metaplasia was widespread in 2 cases and goblet-like cells were visible in 2 cases. In all, the glands and papillae were very much more numerous than in the normal cases, the appearance being microscopically that of adenopapillary erosions. The glands were distended in 1 case. Secretory activity was marked in all.

At 5 to 6 months these changes had increased. Metaplasia was observed 3 times, goblet-like cells were a marked feature in 5 biopsies and distended glands were noted 3 times.

At 6 to 7 months the secretory and proliferative activity of the surface epithelium and the glands had increased further. Metaplasia was widespread in 2 cases, adenomatous masses of glands were seen in 1 biopsy and marked dilatations of glands with flattening of cells was observed in 1 case. Thereafter the changes increased to term and the resemblance to the normal became more marked at term. Inflammatory cells were not a marked feature. When present they were to be found in mucus, in gland lumina, in the vessels and at the mucosquamous junction. In the whole series of 37 slides they were not seen 8 times, a few only 21 times and in any number in restricted localities, such as at the mucosquamous junction, in the tips of papillae,

in gland lumina, in mucus and around areas of metaplasia only 8 times.

Postpartum Biopsies.

There were 3 biopsies collected at 30 to 36 hours postpartum. In all these, unlike the normal cases, the endocervical epithelium was found persisting in an active secreting condition. The stroma was becoming slightly more cellular and Nabothian follicles were observed in 2 biopsies. A few scattered inflammatory cells were noted in all.

The biopsies taken prior to discharge were taken at intervals of 7 to 19 days postpartum. The stroma had increased in amount and in cellularity. There was marked perivascular thickening in all. Evidence of breaking down of squamous epithelium and endocervical glands and surface epithelium was observed in 4 cases. The areas which were undergoing this change were loaded with polymorphs which in some cases were lying among the squamous cells. The dates of this breakdown were 9, 14, 8, and 8 days postpartum, respectively.

One biopsy taken at 7 days postpartum showed as the only recognizable postpartum signs, increase in stroma due to cellular multiplication and perivascular thickening. The endocervical tissue was still active. Metaplasia was present and inflammatory cells were present around the metaplastic cells.

Another biopsy taken at 9 days postpartum had a resting type of squamous epithelium. The stroma was cellular, the cells being chiefly round cells and slight perivascular thickening was observed. The glands were compact, the cells columnar, showing slight secreting activity. Numerous polymorphs were present on the surface and in gland lumina.

The last biopsy was collected from a patient who had toxaemia on the 19th day postpartum. The squamous epithelium was in the resting stage, the stroma was increased in amount and very cellular, the cells being chiefly spindle-shaped. There was marked perivascular thickening. There were 2 patches of squamous metaplasia on the surface, elsewhere these cells were moderately tall and not secretory. There were a few racemose glands lined by inactive cells. Inflammatory cells were not a marked feature.

It would therefore appear that the factor causing a marked hyperplasia of the endocervical mucosa apparently persists for at least a week postpartum. The thickened tissue is then shed and its shedding is accompanied by an intense inflammatory reaction. This feature was not seen at all in the normal cases. The only case where forceps were used showed this interesting persistence of thickened epithelium and its shedding at 14 days postpartum.

Follow-up Biopsies.

These are best studied in 2 groups, those whose cervices appeared normal clinically and those who developed erosion and salpingitis. Two of the first group of patients had microscopically an inactive follicular and papillary erosion, 2 others had inactive endocervical mucosa resembling that seen in normal cervices. One had a microscopically active follicular erosion. Metaplasia was seen in 1, 11 weeks postpartum. Inflammatory cells were not observed in 3 cases and a few only in 2. Perivascular thickening was very obvious in 1 of the inactive cases.

Two biopsies were taken from each of the patients who developed erosions and salpingitis. In both the stroma had become very cellular and in 1 there was marked perivascular thickening. There was a very marked papillary and follicular erosion in 1, the cells were not secreting and no in-

flammatory cells were observed. In the other there were only a few inactive glands but numerous polymorphs at the muco-squamous junction. At 10 weeks post-postpartum in 1 case the only changes to be observed were increase in secretory activity and inflammatory cells in the tips of the papillae. In the other case the changes noted at 14 weeks postpartum were an actively proliferating papillary and follicular erosion, there was no evidence of secretion but there were numerous polymorphs in the vessels and in papillae.

It would appear from this study that these cases which were grouped separately on microscopic appearances were definitely of a different type to the normal cases. They showed a far greater and an earlier response to pregnancy changes than did the normal group, their endocervical mucosa was maintained for a much longer interval after labour and its breakdown was accompanied by an intense inflammatory reaction and the 2 patients who developed salpingitis had no other causal factor but the presence of an antepartum erosion. From the microscopical findings they may be classified as hyperplastic. They may go on to definite erosions of a type to be described later as "Mixed."

C—Abnormal Primigravidae.

In this group there were 37 cases. Their age distribution is: 6 in the group 17 to 20 years, 29 in the 21 to 30 years' group; and 2 in the 31 to 35-years' group. The pH findings are recorded in Table I. They have been disappointing, no clue to the conditions being found in them. It should be noticed that in 7 cases it was impossible to record the vaginal pH and in 8 cases the cervical pH, due to bleeding from the cervical lesion. The findings in the smears are set out in Table II. It is noteworthy that in the vaginal and cervical smears there are proportionately more cases showing an increase in polymorphs and organisms than were observed in the normal and observation or hyperplastic groups. The organisms cultured are tabulated in Table III. There is to be observed a greater variety of organisms. Only 1 patient had a trichomonas vaginalis vaginitis. Twelve patients had a monilial vaginitis. Six patients were monilial carriers and did not develop a vaginitis.

The lesions seen at the patient's first attendance are set out in Table IV, 19 patients had acute cervical erosions, 10 of which were large and 9 were small. Twelve had subacute erosion, 5 of which were large and 7 small. Three patients had chronic cervicitis. One patient had a cervical ulcer on the dorsal surface of the cervix. Fifteen had vaginitis, 4 vulvitis, 1 perineal warts and 1 salpingitis. It will be realized that some of the lesions were multiple.

Table IV.
Lesions Seen at Patient's First Attendance

			Abnormal primigravidae	Abnormal multiparae
Cervical erosion	Acute	Large	10	2
		Small	9	1
	Subacute	Large	5	6
		Small	7	0
Chronic cervicitis			3	8
Laceration of cervix			0	7
Cervical ulcer			1	0
Vaginitis			15	8
Vulvitis			4	3
Perineal warts			1	0
Urethritis			—	1
Salpingitis			1	0

The duration of symptoms is set out in Table V. It was not recorded in 4 cases, not noticed in 5 cases. Four patients complained of discharge since the menarche, 6 had had trouble "for years", 6 had suffered an attack before the onset of cyesis. Two dated their symptoms from the onset

TABLE V.
Duration of Symptoms.

Duration of symptoms	Abnormal primigravidae	Abnormal multiparae
Since menarche	4	1
"For years"	6	0
One attack before present cyesis	6	2
Since previous cyesis	0	8
Since onset of present cyesis	2	2
For 1–3/52 of present cyesis	3	3
For 1–2/12 of present cyesis	6	5
For 2–3/12 of present cyesis	1	0
Not recorded	4	0
Not noticed	5	0

of the pregnancy. Three patients had noticed discharge from 2 to 3 months of cyesis. At least half the patients, therefore, entered into their pregnancy with cervical disease.

BIOPSIES.

These patients can be grouped for purposes of biopsy study into 6 groups. They were referred to the leucorrhoea clinic for treatment of discharge occurring during pregnancy, this explains the first 3 groups.

Group 1. *Patients with Normal Cervices and Vaginitis.*

There were 6 cases in this group. Five had a monilial vaginitis and 1 a trichomonas vaginalis vaginitis.

Their biopsy findings were quite in accordance during pregnancy, postpartum and at return visits with what was seen in the normal group except that the patient with a trichomonas infection had a very marked decidual reaction persisting throughout the course of her pregnancy.

Group 2. *Patients with "Observation" or Hyperplastic Cervices and Vaginitis.*

There were 2 patients in this group. Both had a monilial vaginitis.

The biopsy findings were the same as those recorded in the "Observation" or hyperplastic group throughout pregnancy, the puerperium and the postnatal period, except that there was an increased inflammatory reaction and many more polymorphs.

Group 3. *Patients with a Vitamin-Deficiency Lesion.*

There was only 1 patient in this group. She had a non-specific vaginitis and ulcer on the portio vaginalis cervices. The lesions cleared rapidly with parenteral vitamin B administration and did not recur. The cervical biopsies were of the normal type.

Group 4. *Patients with a Proliferating Type of Cervical Lesion.*

There were 12 patients in this group; 3 had monilial vaginitis as well.

It must be remembered that the changes seen in the normal cases run *pari passu* with the features described below. There was a marked overgrowth of glands and papillae throughout the pregnancy. The cells, however, did not begin to secrete till the normal time—4 to 5 months—about this period, too, reduplication of epithelial cells was first noted. Squamous metaplasia and goblet-like cells appeared about the 6th month. The glands became distended about the 7th month. In all cases, however, inflammatory cells were a very marked feature, especially in the tips of papillae, around glands, at the mucosquamous junction and around areas of metaplasia.

The glands tend to persist even in biopsies collected within 40 hours of confinement, though there may be areas of desquamation of the mucosa with a marked inflammatory reaction. Within 10 to 14 days postpartum there is a papillary erosion reforming, but there is little evidence of secretion, and inflammatory cells, chiefly polymorphs, are numerous. The micro-

scopical evidence of a papillary erosion persisted as long as the cases were followed, even if there was no clinical evidence of cervical erosion. Secretion was not a marked feature.

Group 5. *Patients with a Secreting Type of Cervical Lesion.*

There were 8 cases in this group. Vaginitis was not observed in any of them.

Again the general trend of changes follows the normal pattern. In this group papillae were absent or very low while glands were racemose and did not become elongated to any very marked degree. However, there was evidence of secretion as early as 2½ months, and widespread metaplasia may occur at the same time. Goblet cells were noted at 3½ months. The glands may become distended with secretion and form larger and more numerous Nabothian follicles than was observed in the normal cases; or they may become filled with a honeycomb of metaplastic cells. Inflammatory cells vary in number and type. Where there is much mucus polymorphs are found in great quantities, these cells are also seen in gland lumina, in papillae, around areas of squamous metaplasia in much greater numbers than were seen in normal or hyperplastic cervices.

Up to 40 hours postpartum biopsies show very marked sloughing of the mucosa with areas of haemorrhage and an intense inflammatory reaction. Some glands and areas of metaplasia persist. From 7 to 14 days postpartum there is usually definite evidence of regeneration with a tendency to formation of a follicular type of erosion but little secretion is seen. At return visits biopsies showed persisting metaplasia, follicular erosion and inflammatory cells around metaplastic areas in glands and at the mucosquamous junction. Secretion was more commonly seen than in the proliferative lesions.

Group 6. *Patients with a Proliferating and Secreting or Mixed Type of Cervical Lesion.*

There were 8 patients in this group, 3 of them had monilial vaginitis.

The biopsies in this group showed features of both the preceding groups throughout the entire period they were under observation. Some cases tended to the proliferating group, others to the secreting group. All stages from the one to the other were seen.

D—Abnormal Multiparae.

In this division there were 21 cases. Their age distribution is as follows: Only 1 was under 20 years, 12 were between 21 and 30, 6 were between 31 and 35, and 2 between 36 and 40 years. The pH findings are recorded in Table I. They, like those of the abnormal primigravidae, were not helpful in elucidating the problem. Bleeding prevented a record being taken in only 1 case.

The findings in the smears are set out in Table II. They, like those of the abnormal primigravidae, show a greater number of polymorphs and organisms in cervical and vaginal smears than was noted in the normal and "observation" primigravidae. The organisms cultured are to be found in Table III. Only 1 patient had a trichomonas vaginalis infection. Four patients were monilial carriers and did not develop a vaginitis while 8 patients had monilial vaginitis.

The lesion seen at the patient's first attendance are set out in Table IV. Three patients had acute cervical erosion, 2 of which were large and 1 was small. Six patients had large subacute erosions. Eight patients had chronic cervicitis, 7 had large cervical laceration. Eight patients had vaginitis, 3 had vulvitis and 1 had urethritis. It will be realized that most patients had multiple lesions.

The duration of symptoms is set out in Table V. One patient had had trouble since the menarche. Two had had an attack before the present pregnancy. Eight patients stated their symptoms were first noticed at the onset of the present cyesis and 8 said symptoms first developed during the present pregnancy. Half the patients, therefore, had definite evidence of a cervical lesion before pregnancy began. Ten patients only noted their symptoms during the present pregnancy. However, from inspection of the cervix only 3 patients appeared to have a genuinely acute condition. Most of the lesions appeared to be an acute exacerbation of a chronic condition.

Biopsies.

In this subdivision all the patients had a cervical lesion and they, therefore, fall into 3 groups.

Group 1. *Patients with a Proliferating Type of Cervical Lesion.*

There were 4 patients in this group. One had an acute lesion. The other 3 patients had evidence of old "cervicitis". Two had monilial vaginitis.

The biopsy findings did not differ from those seen in the abnormal primigravidae cases.

Group 2. *Patients with a Secreting Type of Cervical Lesion.*

There were 6 patients in this group. Three had a monilial vaginitis and 1 had both a monilial and trichomonas vaginalis vaginitis. Five patients had big cervical lacerations and 1 had evidence of long-standing "cervicitis".

The biopsy findings were the same as those noted among the similar group of abnormal primigravidae.

Group 3. *Patients with a Proliferating and Secreting Type of Cervical Lesion.*

This was the largest group, comprising 11 patients. Two patients had a monilial vaginitis. Three patients had an acute cervical condition. Two patients had large cervical lacerations and 6 had evidence of long-standing "cervicitis".

The biopsy findings were the same as those observed among the similar group of abnormal primigravidae.

Squamous Metaplasia.

So much has been written on the possibility of squamous metaplasia in the cervix being the forerunner of squamous-cell carcinoma that a word must be said about this. From the description of the changes in the pregnant and post-partum cervix it is obvious that metaplasia of varying degrees is a normal occurrence. It is seen in all groups of cervices—normal, observation or hyperplastic, and abnormal. It occurs at an earlier stage in the abnormal cervices and is more widespread probably because glandular proliferation is a more marked feature. Areas of squamous metaplasia are frequently surrounded in the abnormal cervices by inflammatory cells, chiefly polymorphs but sometimes by round cells in the more chronic cases. As seen in these biopsies the change is quite benign and does not appear to have any malignant tendencies. While the various staining methods used by Carmichael and Jeaffreson (1941) were not employed all the various types of metaplasia they describe have been observed. Similar findings are also recorded by Hofbauer (1933) who was inclined to believe that these changes may be the possible starting point of a carcinoma. Auerbach and Pund (1945) believe that a common parent cell may give rise to a metaplastic or a frankly carcinomatous cell. Carmichael and Jeaffreson

(1941) are inclined to the view that the two conditions are not related. From a study of the biopsies taken in this investigation, and from a correlation with sections taken from cervices of non-pregnant patients removed at operation in the gynaecological service there would appear to be a profound difference between this type of cell change and that seen in early cases of carcinoma *in situ*.

Decidual Reaction.

A special comment on this finding must be made before leaving the description of the biopsies. It was observed in 2 normal cases, once at 10 weeks' cyesis and again for the first time at 20 weeks. It was last observed at 38 weeks' cyesis. It was noted once at 29 weeks' cyesis among the "Observation" or hyperplastic group. The condition was noted in 10 abnormal primigravidae. The earliest period at which it was observed was 14 weeks' cyesis and in 1 case it was found in a biopsy taken 15 hours after confinement. It was observed in 10 cases among the abnormal multiparae. The earliest biopsy in which it occurred was taken at 12 weeks' cyesis. The latest biopsy in which it was observed was taken at 14 hours after confinement. The only suggestion offered to account for this marked increase in the abnormal cases is that the external os is more patulous in the abnormal groups and that therefore it is easier to take a biopsy higher up the cervical canal where, according to Petrowa and Berkowskaja, decidual changes are more likely to occur.

E—Review of Bacteriological Findings.

Bacteriological findings of cultures from cervix, vagina and urethra are set out in Table VII. It will be noted that in agreement with other observers (Hite, Hesseltine and Goldstein, 1947; Bryce, 1928) a wide range of organisms has been recovered, and of these the commonest is the non-haemolytic streptococcus. The complete absence of the haemolytic streptococcus is noteworthy and *S. aureus* was recovered only once. While the whole range of organisms was recovered in the normal group, the total number of colonies

Table VII.
Comparison of Haemoglobin Values During Cyesis.

Trimester	Hb.	Normal Total 12	Observation Total 7	Abnormal primigravidae Total 37	Abnormal multiparae Total 21
	per cent				
	90–100	3	1	6	2
	80– 89	3	1	15	8
First	70– 79	4	4	13	2
	60– 69	—	1	1	2
	90–100	—	—	1	2
	80– 89	2	—	4	3
Second	70– 79	—	1	6	4
	60– 69	—	—	—	—
	90–100	1	—	3	—
	80– 89	8	4	14	7
Third	70– 79	2	3	15	5
	60– 69	1	—	3	2

on the culture plates was usually low and the presence of the non-haemolytic streptococcus was as frequent as in the abnormal group. The significance of the findings is difficult to assess, since all the bacteria found are commonly considered non-pathogenic in these situations.

The isolation and maintenance of the normal lactobacillus proved unexpectedly difficult, and it was constantly noted that while stained smears from the vagina revealed organisms present by tens and hundreds, the colonies on the plates incubated aerobically were to be counted in units and tens. Two possibilities presented themselves to account for this—firstly inadequate methods of cultivation, and secondly the presence of some antibacterial or inhibitory agent soluble in the secretions. Attempts were made to get over this by introducing a series of culture media, and incubating them under anaerobic and aerobic conditions. These were desoxycholate citrate agar, tartaric acid agar, acetic acid broth, liver digest broth, penicillin broth 10 u/ml. and media containing sheep or human or horse blood. Apart from a single isolation of *Clostridium welchii*, these did not provide any additional information.

Saline vaginal washings were seitz-filtered and added to culture medium, and compared with cultures on plates without such addition, but no effect could be demonstrated. The fact that oestrin preparations are suspended in oil made it impossible to work with them *in vitro* for a similar purpose.

The clinical picture of monilial vaginitis was always confirmed by recovery of *Monilia albicans* in culture, while 2 of the normal patients proved to be carriers of that organism.

The question of synergism between organisms of the normal flora and parasitic invaders is a thorny one and no evidence had been obtained in this study to suggest a line of attack which might prove profitable.

F—Review of Antenatal Treatment.

It is a truism that treatment depends upon cause. Where the cause is known it is actively treated. In these cases the only definite known causes were the vaginal infections caused by monilia and *T. vaginalis*.

Trichomonas Vaginalis Vaginitis.

One primigravida had an uncomplicated trichomonas infection. She was given stovarsol vaginal compound tablets, one night and morning and was speedily cured.

One multipara had *T. vaginalis* and monilial infection as well as a cervical lesion. She was under treatment at term, having been given stovarsol and the treatment described below for monilial vaginitis.

Monilial Vaginitis.

It must be remembered that only 5 patients had an uncomplicated vaginitis. The others all had cervical lesions, so that often treatment was directed at this condition as well. Further, many patients were referred just before term when it was impossible to judge of cure. The lines on which treatment was given are discussed in a previous paper by one of us (McIlrath, 1946). Glycosuria was found to be an aggravating factor in 19 out of the 21 cases with monilial vaginitis and these patients were put on a reduced carbohydrate diet. It was also borne in mind that infection may come from the bowel and the patient was advised to change her drawers and body-towel daily and boil them to destroy the organisms. More recently it has been the custom to order 20 g. of sulphaguanidine in the hope of preventing reinfection from the bowel. Only 3 cases in which this

was tried are included in this series, in 2 the condition was cured, in the remaining 1 the patient was still under treatment at term. Merthiolate suppositories as described in the paper quoted above were used in combination with other forms of treatment on 11 patients. It was found necessary to use gentian violet paintings 2 or 3 times weekly for 3 patients. This was usually a last line of attack. When this investigation was first started only sulphonamides were available to clear the cervical condition. They were used on 4 patients with monilial vaginitis, and in 3 of these cases in combination with a reduced carbohydrate diet, vitamin-therapy and methiolate suppositories they were successful, while in the 4th case it was found necessary to add gentian violet paintings. When penicillin-sulphanilamide powder became available it was found that the cervical lesions cleared much more rapidly and strangely enough the vaginitis did so as well. Three patients were cured by application of penicillin-sulphanilamide powder and a reduced carbohydrate diet, 1 when vitamin therapy was added, and another 1 when sulphaguanidine was added as well. Two patients required the powder, diet, vitamins and merthiolate suppositories. Thirteen patients at term were still under treatment with various combinations of these five.

Treatment of Cervical Conditions.

In the patients who had no vaginitis and no definite known cause for the cervical lesion the problem was different. It was assumed that two factors were involved, one a hormonal factor, the other an infection superimposed on the macroscopic and microscopic changes occurring in the cervix.

The first effort was directed at removing any infection that might be present. At the onset of the investigation only sulphathiazole was available and this was used in 5 cases. Later a supply of penicillin-sulphanilamide powder was made available. It was applied in the out-patient department by an experienced sister. A sterile speculum was inserted into the vagina, the cervix was exposed and a thick coat of the powder was blown on to the lesion by means of a Wyeth insufflator. The treatment was given twice weekly for 2 weeks before the clinician saw the patient again, when it was repeated or not depending on the condition of the lesion. If the lesion appeared to be "healing" and the discharge lessening and becoming mucoid instead of purulent it would be suspended. If there was any doubt, especially near term, or if the findings were unaltered the treatment was repeated. It is amazing to see how these lesions improve clinically with this treatment. Microscopically inflammatory cells disappear or diminish in number in a remarkable manner, thus suggesting that a very important secondary factor is infection.

Unfortunately it was impossible to undertake any hormonal estimations on these patients, so it was decided to use them as "guinea-pigs" and see how they responded to treatment.

Cervical lesions described by Hisaw and Lendrum (1936) and Overholser and Allen (1935) resembling those seen in these patients were caused by massive doses of oestrin, so on 17 occasions various preparations of luteal hormone were employed in dosage of 5 international units twice weekly for 4 weeks in an endeavour to restore hormonal balance. Results were quite disappointing. It was decided to try oestrin, so 10,000 international units of oestroform were given twice weekly for 4 weeks to 8 patients. No untoward effects were observed but there was no improvement in the cervical condition. The only other hormone preparation used was

Antuitrin "S" (anterior pituitary-like principle obtained from human pregnancy urine) in dosage of 1 ml. (100 I.U.) twice weekly for 2 weeks. It was used on 2 patients without any effect on the cervix. It was therefore decided that direct hormone-therapy was of little avail especially as hormone-assays could not be used to check dosage and drug.

Recent clinical and laboratory work (Biskind, Biskind, and Biskind, 1944; Singher, Kensler, Taylor, Rhoads and Unna, 1944; Segaloff and Segaloff, 1944; Engel and Rosenberg, 1945; Koref and Engel, 1946), however, suggests that the liver inactivates oestrin when the subject is taking a diet containing an adequate amount of vitamin-B complex. It was felt that the administration of the B-complex might help to inactivate excessive amounts of oestrin and so perhaps hasten a return to normal in the cervical condition. As absorption of this complex may be poor when the patient is suffering from a B-avitaminosis, parenteral administration was given in bad cases or at the commencement of treatment in doses of 10 mg. Vibex thrice weekly. Later, or in less severe cases, Vibex 18 mg. daily was ordered by mouth. It was combined with potantol* mv thrice daily to provide vitamin A, hoping this would help to combat infection.

At a result of treatment along these lines the following results were obtained:

Appearance of cervix at term	Multiparae	Abnormal primigravidae	Observation primigravidae	Normal primigravidae
Clinically healthy	4	11	4	12
Clinically not cured	4	8	3	—
Clinically improved	13	18	—	—
Total number	21	37	7	12

* 1 ml. (m. 17) contains vitamin A 16,000 international units, and vitamin D, 2,000 international units.

G—Labour, Puerperium and End Results.

In order to assess the part played by these lesions in causing low-grade pelvic infections it is necessary to review the patient's general health, any complications that may have occurred during pregnancy and labour, the nature of labour, its duration, any trauma that may have occurred, any interference that may have been undertaken, and the nature of the puerperium. These findings are set out in Table VI.

General Health.

The haemoglobin-percentage is taken as an index of the patient's general condition and these readings are set out in Table VII. Three patients in the normal group had values below 80 per cent in the 3rd trimester of pregnancy, 2 patients had values below 80 in the observation or hyperplastic group and the finding was not recorded once. Among the abnormal multiparae the haemoglobin-value was not taken in 4 cases and was below 80 in 7 cases. Hence approximately one third of all the patients were "below par" at the onset of labour.

Complications.

These were rare. Toxaemia occurred once each in the normal group, the observation group, the abnormal primigravidae and the multiparous patients. There was 1 patient who had bronchiectasis and a patent *ductus arteriosus*, another who had a definite vitamin-B deficiency and a third who had a severe anaemia. These 3 patients were in the abnormal primigravidae group.

Type of Labour.

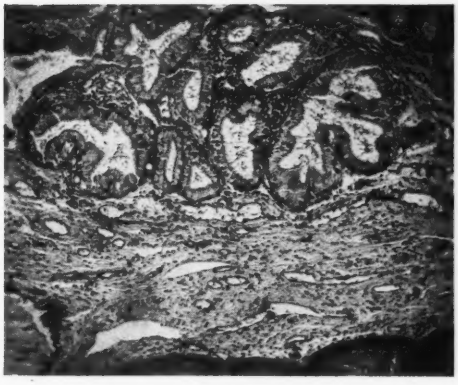
In the normal group 3 patients had instrumental deliveries and all 3 had

TABLE VI.

Hb per cent in 3rd trimester		Complications	Condition of cervix at last prenatal visit	Duration of labour in hours	Nature of delivery	Condition of perineum	Puerperium	Pelvic condition at last postpartum visit	Date of last post-partum visit
				NORMAL CASES					
J.B.	88	—	Healthy	13	Normal	Intact	Febrile	Report by letter—premenstrual backache	6/12
E.C.	89	—	Healthy	11¾	Normal	Lacerated	Febrile	Cervical laceration	6½/12
E.C.	77	—	Healthy	68	Instru-mental	Lacerated	Febrile	Failed to report	
J.L.	89	—	Healthy	11¾	Normal	Lacerated	Afebrile	Report by letter—had retroversion—feeling well	6/12
D.McF.	85	—	Healthy	11½	Normal	Intact	Febrile	Lacerated cervix—salpingitis	3/12
B.O.	98	—	Healthy	11½	Normal	Intact	Febrile	Normal	3/12
T.O.	80	—	Healthy	42	Normal	Intact	Febrile	Failed to report	
L.T.	89	—	Healthy	14	Normal	Intact	Febrile	Cervical erosion—salpingitis retroversion	4/12
E.W.	88	—	Healthy	4	Instru-mental	Intact	Afebrile	Normal	2½/12
M.I.W.	76	—	Healthy	74½	Instru-mental	Intact	Afebrile	Cervical laceration	3½/12
M.P.W.	81	Toxaemia	Healthy	69½	Instru-mental	Lacerated	Afebrile	Cervical laceration	4/12
D.M.	76	—	Healthy	11½	Normal	Lacerated	Febrile	Normal	4/12
				OBSERVATION CASES					
E.C.	84	Pre-eclampsia	Healthy	6½	Normal	Lacerated	Febrile	Normal	4/12
M.F.	74	—	Healthy	7½	Normal	Intact	Afebrile	Normal	3½/12
E.F.	83	—	Healthy	13	Normal	Intact	Febrile	Normal	3/12
E.J.S.	88	—	Healthy	9	Instru-mental	Lacerated	Febrile	Normal	3/12
K.M.	78	—	Eroded	17¾	Normal	Intact	Afebrile	Subacute salpingitis	4/12
A.W.	81	—	Healthy	23¾	Normal	Intact	Afebrile	Normal	3/12
J.W.	?	—	Eroded	10½	Normal	Intact	Afebrile	Acute cervical erosion—salpingitis	5/12

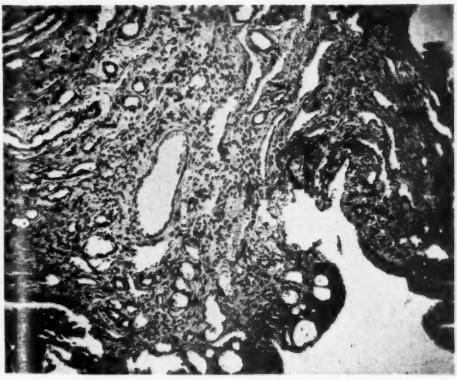
PHOTOMICROGRAPH 1 (Z4568)

Biopsy of cervix of normal primigravida 10 weeks cyesis. Note thickening of squamous epithelium, increasing vascularity of stroma. Glands not prominent, slight secretory activity.



PHOTOMICROGRAPH 2 (AA820)

Biopsy of cervix of normal primigravida 18 weeks cyesis. Note that glands are increasing in number and activity.



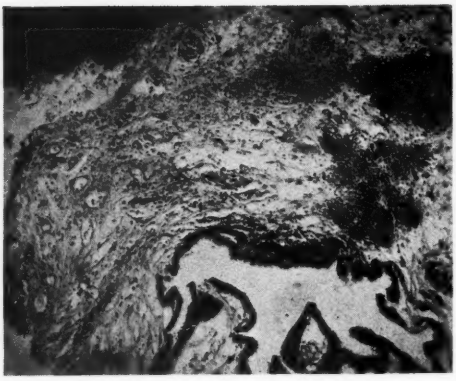
PHOTOMICROGRAPH 3 (AA2096)

Biopsy of cervix of normal primigravida 26 weeks cyesis. Note presence of oedema in stroma, goblet cells and metaplasia.

M. B. McI.

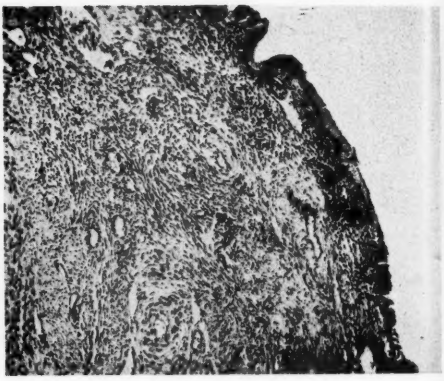
PHOTOMICROGRAPH 4 (AA1974)

Biopsy of cervix of normal primigravida 34 weeks cyesis. Note scanty stroma with marked increase in vascularity and oedema. Increase in number of glands with crowding and reduplication of cells, a syncytial-like arrangement at times and metaplasia.



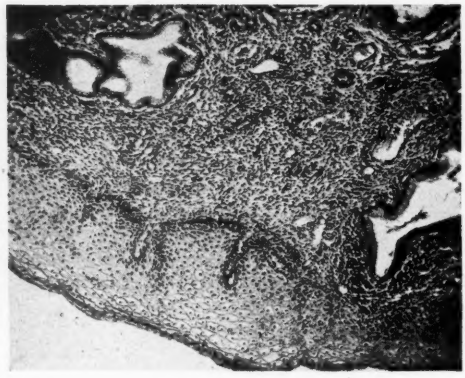
PHOTOMICROGRAPH 5 (AA2153)

Biopsy of cervix of normal primipara 14 hours post-partum. Delivery normal. Note increase in cellularity of stroma and thinning of squamous epithelium, one ragged, collapsed and inactive gland.



PHOTOMICROGRAPH 6 (AA3512)

Biopsy of cervix of normal primipara 11 days post-partum. Delivery normal. Note very marked increase in cellularity of stroma, perivascular thickening, low inactive endo-cervical epithelium.



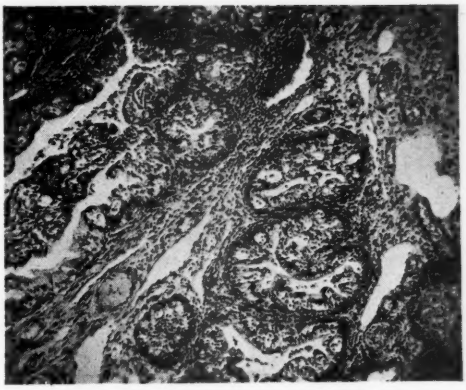
PHOTOMICROGRAPH 7 (AA3446)

Biopsy of cervix of normal primipara 3 months post-partum. Pelvis normal. Complete regeneration of cervix to resting condition, perivascular thickening persists.

M. B. McI.

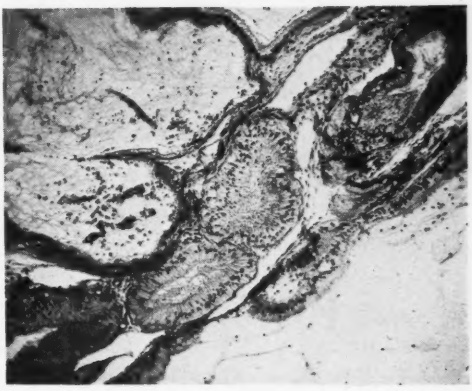
PHOTOMICROGRAPH 8 (AA1009)

Biopsy of cervix, hyperplastic type primigravida 16 weeks cyesis. Note increase in number and activity of glands compared with normal case.



PHOTOMICROGRAPH 9 (AA920)

Biopsy of cervix hyperplastic type primigravida 25 weeks cyesis. Metaplasia a very marked feature, numerous goblet cells.



PHOTOMICROGRAPH 10 (AA3205)

Biopsy of cervix hyperplastic type primigravida on term. Note numerous glands, some dilated, marked secretory activity and some inflammatory cells.

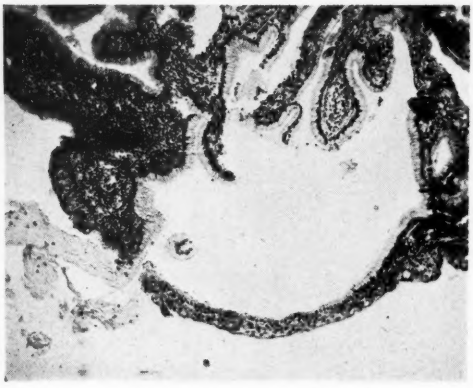
PHOTOMICROGRAPH 11 (AA493)

Biopsy of cervix proliferating type primigravida 14 weeks cyesis. Note marked increase in papillæ and glands. Secretion not a marked feature. Inflammatory cells fairly numerous.

M. B. McI.

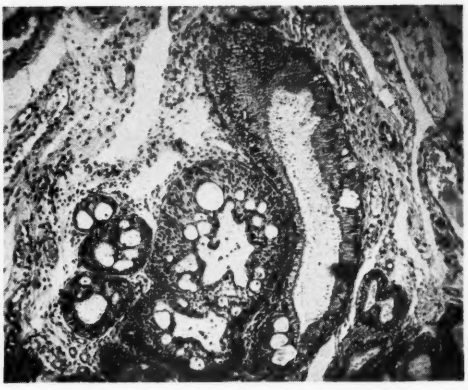
PHOTOMICROGRAPH 12 (AA506)

Biopsy of cervix of secreting type primigravida 10 weeks cyesis. Note the widespread metaplasia and numerous goblet cells. There is not much reproduction of glands. Numerous inflammatory cells.



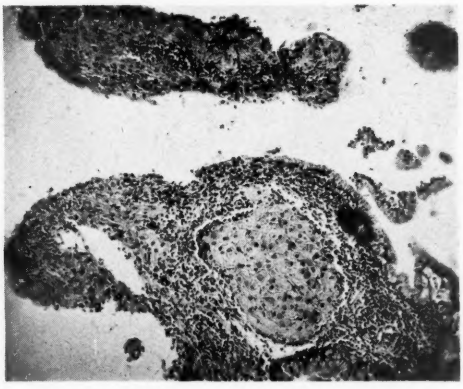
PHOTOMICROGRAPH 13 (AA1008)

Biopsy of cervix of mixed type multipara 10 weeks cyesis. Note proliferation of glands, increased secretory activity and a strip of metaplasia with a few goblet cells. Numerous inflammatory cells.



PHOTOMICROGRAPH 14 (AA1121(i))

Biopsy of cervix normal primigravida 34 weeks cyesis showing widespread metaplasia.



PHOTOMICROGRAPH 15 (AA1121(ii))

Biopsy of cervix normal primigravida 34 weeks cyesis showing marked decidual reaction.

M. B. McI.

TABLE VI (*Continued*).

Hb per cent in 3rd trimester		Complications	Condition of cervix at last prenatal visit	Duration of labour in hours	Nature of delivery	Condition of perineum	Puerperium	Pelvic condition at last postpartum visit	Date of last post-partum visit
				ABNORMAL PRIMIGRAVIDAE					
I.L.	76	—	Healthy	26¼	Normal	Intact	Afebrile	Normal	4½/12
G. McD.	82	—	Healthy	13½	Instru-mental	Lacerated	Febrile	Normal	2/12
R.P.	80	—	Healthy	15¾	Instru-mental	Lacerated	Febrile	Did not report	
N.N.	75	—	Healthy	15	Instru-mental	Lacerated	Febrile	Salpingitis—persisting glycosuria	2/12
E.L.	?	—	Healthy	8½	Normal	Intact	Afebrile	Lacerated cervix—retroversion	5/12
Be.Go.	?	Patent ductus arteriosus, bronchiectasis	Erosion healing	19¾	Instru-mental	Lacerated	Afebrile	Cervical laceration	4/12
P.C.	?	—	Healthy, monilial vaginitis	51¾	Instru-mental-	Lacerated	Afebrile	Cervical laceration	3/12
M.deM.	78	—	Erosion active	19¼	Normal	Intact	Afebrile	Endo-cervicitis (mild)	4/12
I.S.	77	—	Erosion acute, monilial vaginitis	5	Normal	Lacerated	Febrile	Did not report	
I.P.	90	—	Nabothian follicles + +	15¾	Normal	Intact	Febrile	Normal	5/12
N.T.	75	—	Healthy	13	Normal	Intact	Afebrile	Salpingitis and cervicitis	2½/12
E.E.	84	—	Erosion healing	12¾	Normal	Intact	Febrile	Salpingitis and cervical erosion	2/12
L.B.	82	Pre-eclampsia	Erosion clean	48½	Instru-mental	Intact	Afebrile	Normal	2/12
N.B.	89	—	Eroded, mucopus + +	7½	Normal	Intact	Febrile	Acute cervical erosion	6½/12
M.L.	98	—	Erosion healing	10	Instru-mental	Lacerated	Febrile	Normal	6/12
P.D.	68	—	Healthy	25	Normal	Intact	Febrile	Cervical erosion—retroversion	2½/12
B.H.	75	—	Healthy	17½	Normal	Intact	Afebrile	Retroversion	3/12
B.W.	79	—	Acute erosion	19	Normal	Intact	Afebrile	Normal, cervical erosion—yielded to treatment	4/12
E.H.	85	—	Healthy	19½	Normal	Intact	Afebrile	Normal	3/12
G.A.	75	Avitaminosis	Healthy	20½	Instru-mental	Lacerated	Febrile	Subacute salpingitis	3/12

TABLE VI (*Continued*).

	Hb per cent in 3rd trimester	Complications	Condition of cervix at last prenatal visit	Duration of labour in hours	Nature of delivery	Condition of perineum	Puerperium	Pelvic condition at last postpartum visit	Date of last postpartum visit
I.R.	77	—	Erosion quiescent	8½	Instrumental	Lacerated	Afebrile	Did not report	
B.J.S.	83	—	Erosion active	3	Normal	Intact	Febrile	Cervical erosion	4½/12
V.I.	85	—	Erosion quiescent	26½	Normal	Intact	Afebrile	Cervical laceration, salpingitis	5/12
J.W.	74	—	Healthy	14½	Instrumental	Intact	Febrile	Subacute cervicitis and salpingitis	3½/12
E.G.	84	—	Erosion	15	Normal	Intact	Afebrile	Normal	3½/12
G.K.	90	—	Healthy	6	Instrumental	Lacerated	Afebrile	Subacute metritis and salpingitis	6½/12
H.M.S.	78	—	Healthy	12	Normal	Intact	Febrile	Cervical laceration	6/52
M.R.	?	—	Polyps present	12½	Normal	Lacerated	Afebrile	Normal	4½/12
B.G.	64	—	Healthy	?	Normal	Intact	Afebrile	No report	
J.Mc.G.	75	—	Polyps present	16	Instrumental	Lacerated	Febrile	Cervical laceration and retroversion	2½/12
E.Au.	82	—	Healthy	15½	Normal	Intact	Afebrile	Normal erosion healed with treatment	4/12
E.An.	88	—	Erosion quiescent	7	Instrumental	Lacerated	Febrile	Report by letter; doctor states pelvis normal	5/12
E.B.	70	Anaemia 2.9×10^6 R.B.C.	Erosion healing	7¾	Normal	Intact	Afebrile	Subacute cervical erosion —subinvolution	6/52
L.A.	74	—	Erosion active, monilial vaginitis	8¾	Instrumental	Lacerated	Febrile	Chronic cervical erosion	5/12
W.M.	82	—	Erosion active	12¾	Instrumental	Intact	Febrile	Subacute salpingitis and cervicitis	3½/12
N.B.	85	—	Erosion active	18	Normal	Intact	Afebrile	Acute cervical erosion	6½/12
J.S.	?	—	Healthy	13	Normal	Lacerated	Afebrile	Normal	3/12
				ABNORMAL MULTIPARAE					
M.L.	75	—	Nabothian cyst, monilial vaginitis	5	Normal	Intact	Afebrile	Normal, Bartholin cyst	3/12
R.M.	76	—	Polyps present	7½	Normal	Intact	Afebrile	Normal	3½/12
F.L.	81	—	Endocervicitis	17	Normal	Intact	Afebrile	Cervicitis and salpingitis	3½/12

TABLE VI (*Continued*).

	Hb per cent in 3rd trimester	Complications	Condition of cervix at last prenatal visit	Duration of labour in hours	Nature of delivery	Condition of perineum	Puerperium	Pelvic condition at last postpartum visit	Date of last post-partum visit
A.J.	69	—	Cervix quiescent monilial	10½	Normal	Intact	Afebrile	Mild cervicitis and cervical laceration	5½/12
M.B.	80	—	Lacerated cervix, mild cervicitis	38½	Instru-mental	Intact	Not recorded	Lacerated cervix, retro-version and salpingitis	3/12
S.M.	?	—	Nabothian follicles mucus + +	14¾	Normal	Intact	Febrile	Did not report	
B.K.	84	—	Lacerated cervix, monilial vaginitis	5	Normal	Intact	Afebrile	Cervical laceration	6/12
H.S.	81	—	Cervix lacerated, erosion healing	22	Normal	Intact	Afebrile	Cervix lacerated and acutely eroded	2½/12
J.S.	64	—	Cervix lacerated, erosion quiescent	12½	Normal	Intact	Afebrile	Subacute metritis and salpingitis, cervix lacerated	4/12
J.M.L.	90	—	Cervix lacerated, erosion quiescent	16	Normal	Intact	Afebrile	Subacute cervicitis, metritis and salpingitis, cervical laceration	3/12
B.P.	?	—	Cervix quiescent	12	Normal	Intact	Afebrile	Subacute salpingitis and cervicitis, cervix lacerated	3/12
K.L.	85	—	Erosion, clean	2½	Normal	Intact	Afebrile	Normal	8/12
E.H.	?	—	Erosion quiescent	7½	Normal	Intact	Afebrile	Report by letter—discharge and menorrhagia	3/12
W.B.	?	—	Erosion healing	9	Normal	Intact	Febrile	Chronic cervicitis	3/12
J.B.	77	—	Polyps present	31¾	Normal	Intact	Febrile	Chronic cervicitis and salpingitis	6/12
F.O.	?	—	Erosion quiescent	4½	Normal	Intact	Afebrile	Subacute cervicitis, metritis and salpingitis	3½/12
I.G.	87	—	Erosion quiescent	6¾	Normal	Intact	Afebrile	Acute cervical erosion	2½/12
H.McG.	74	—	Erosion quiescent	20¾	Normal	Intact	Afebrile	Subacute salpingitis, mild cervicitis, anaemia	3/12
J.G.	95	—	Cervix healthy	2½	Normal	Intact	Afebrile	Normal	4½/12
T.H.	84	Post-partum H'ge.	Quiescent, lacerated			Intact	Afebrile	Subacute metritis and salpingitis	7/12
O.S.	75	—	Lacerated mucopus + +	16¾	Normal	Intact	Afebrile	Cervix acutely eroded and lacerated	3/12

labours lasting over 68 hours. The length of labour for the other 9 patients was under 15 hours except for 1 patient whose labour lasted 42 hours.

In the observation or hyperplastic group 1 patient had an instrumental delivery, her labour lasting 9 hours. All the others delivered themselves, no labour lasting longer than 24 hours.

In the abnormal primigravidae group 15 patients were delivered by forceps, 1 of them having a labour lasting 51¾ hours. All the other labours in this group lasted under 26 hours.

In the abnormal multiparae group only 2 patients had an instrumental delivery. The longest labour in this group was 38½ hours, another was 31¾ hours—the remainder were under 20 hours.

Trauma.

The perineum was lacerated 4 times in the normal group, twice in the observation or hyperplastic group, 15 times in the abnormal primigravidae group and not at all in the abnormal multiparae group. Cervical laceration occurred 4 times in the normal group, not at all in the observation group, 5 times in the abnormal primigravidae and once in a patient whose cervix was not torn previously in the abnormal multiparae. It is interesting to note that 3 patients in the normal group, 3 in the abnormal primigravidae and 1 in the abnormal multiparae group suffered cervical lacerations without interference with instruments. It is apparently possible for a patient to force a full-time baby through an incompletely dilated os and tear the cervix herself. It would appear that obstetricians need not take all the blame for cervical lacerations.

Puerperium.

Pyrexia in the puerperium was recorded 8 times in the normal group, 3 times in the observation group, 18 times among the abnormal primigravidae, and 5 times among the abnormal multiparae. Trauma or interference or a prolonged labour may have accounted for 3 cases in the normal group, 1 in the observation group, 12 in the abnormal primigravidae and 1 in the abnormal multiparae.

Pelvic Findings at Final Return Visit.

Patients were seen at 2 to 6 months postpartum. Sometimes only one visit was made, more often two. When treatment was necessary several visits were paid. The condition at the last visit is the condition reviewed.

Failures to report back were few. There were 2 in the normal group, none in the observation group, 4 among the abnormal primigravidae and 1 among the abnormal multiparae.

Answers to questionnaires were obtained from 4 patients in the normal group, and from 2 in the abnormal primigravidae and 1 in the multiparae groups. In the normal group 1 of these patients complained of premenstrual backache and another had received treatment for retroversion, otherwise both were well.

Two others were well, had no discharge and were nursing satisfactorily. One patient in the abnormal primigravidae group stated that her own doctor had informed her that her pelvic organs were normal. The other 2 had slight discharge but were well and lactating satisfactorily. The abnormal multipara stated that she was not at all well, she had discharge and menorrhagia and had been unable to feed her baby.

The findings in the remaining cases are set out in Table VIII.

Normal pelvic findings were observed in 3 patients in the normal group, in 5 patients in the observation group, in 11 patients among the abnormal primi-

TABLE VIII.
Pelvic Findings at Final Return Visit.

Type of pelvic lesions observed	Normal	Observation	Abnormal primigravidae	Abnormal multiparae
Total cases observed	8	7	32	19
Normal	3	5	11	4
Traumatic lesions	3	—	6	1
Inflammatory lesions	—	2	13	6
Traumatic and inflammatory lesions	2	—	2	8
Failed to return	2	—	4	1

gravidae and in 4 cases among the abnormal multiparae. Clinically healthy cervices at the last antenatal visit were observed in all the normal group, in all the observation group, in 5 cases among the abnormal primigravidae and in 1 case among the abnormal multiparae. The deviations from normal that were observed at the last antenatal visit in these 9 patients were: "clean erosions" (that is no mucopurulent discharge or mucus present) 2 cases; small polypoidal projections of endocervical mucosa from the external os in 2 cases, Nabothian follicles in 2 cases; "healing erosions" (that is, erosions becoming covered with squamous epithelium) in 1 case; and "acute erosion" (that is erosion with mucopurulent discharge and likely to bleed on manipulation) in 1 case. This last patient on her first postnatal visit had an acute erosion which, however, yielded to treatment.

Lesions due to Trauma.

Seven patients had cervical lacerations: of these 3 were normals, 3 abnormal primigravidae and 1 an abnormal multipara whose cervix had not been torn at a previous confinement. One abnormal primigravida had retroversion and 2 had cervical lacerations and retroversion. Of these 7 patients in the abnormal groups 1 had a quiescent cervix and monilial vaginitis at her last antenatal visit; she had a normal delivery and her perineum was intact; 1 patient who had an instrumental delivery and whose perineum was lacerated had some endocervical mucosal polyps protruding from the os at her last antenatal visit; another patient who had an instrumental delivery and whose perineum was lacerated had a healing erosion at term. The remaining 4 patients had clinically healthy cervices at term, 1 had an instrumental delivery and suffered a perineal laceration; the other 3 had normal confinements, 2 were intact and 1 had a lacerated perineum.

Lesions Due to Inflammation Alone.

No patient in the normal group developed any of these lesions. One patient in the observation group developed salpingitis and 1 a cervical erosion and salpingitis. Both these patients had cervical erosions at their last prenatal visit, both had normal deliveries and intact perinea. Thirteen patients in the abnormal primigravidae group developed inflammatory lesions. They were grouped as follows: salpingitis, 2 cases; salpingitis and metritis, 1 case; cervical erosion, 5 cases; endocervicitis (that is, vaginal surface of the cervix normal, mucopurulent discharge from the os), 1 case; and salpinpingitis and erosion, 4 cases. All the patients with postnatal erosions entered labour with active erosions, only 1 had an instrumental delivery and perineal laceration, the others all had normal deliveries

and intact perinea. The patient who developed endocervicitis had an active erosion at term, her labour was normal and she suffered no perineal lacerations, as did the patient who developed salpingitis and metritis. All 3 had clinically normal cervices at term. Of the 4 patients who developed salpingitis and a cervical erosion 2 had clinically healthy cervices at their last prenatal visit and 2 had erosions, 1 healing and 1 still active. None of these 4 patients suffered a perineal laceration but 1 patient with a clinically healthy cervix had an instrumental delivery, as did the 1 patient with an active erosion. Six abnormal multiparae developed inflammatory lesions: 2 had cervical erosions at their last prenatal visit and 3 erosion and salpingitis and 1 subacute metritis, salpingitis and erosion. In the erosion group 1 patient had quiescent erosion at term, her confinement was normal and she had no perineal laceration. The other patient had a healing erosion at term, her confinement was normal and her perineum was not lacerated. Of the 3 patients who developed salpingitis and erosion 2 had normal deliveries and no perineal lacerations and 1 an instrumental delivery but no perineal laceration. Their labours lasted respectively, 17, 31¾, and 20¾ hours. One had polypoidal overgrowth of the endocervical mucosa, another endocervicitis, and the third a quiescent erosion at their last prenatal visit. One patient who developed subacute metritis, salpingitis and cervicitis had a quiescent erosion at her last antenatal visit, her labour was normal, lasting 4 hours, and she did not suffer a perineal laceration.

Multiple Lesions—Trauma and Inflammation.

Two patients in the normal group had multiple lesions at their last postnatal visit. One had a lacerated cervix and salpingitis, she had a normal confinement and an intact perineum. The other patient had a retroversion, salpingitis and a cervical erosion. Her delivery had been normal and her perineum intact. Among the abnormal primigravidae 2 patients had multiple lesions at their final postnatal visit. One had a cervical laceration and salpingitis, she entered labour with a clinically quiescent erosion, and a labour lasting 26½ hours and finally delivered herself without a perineal laceration. The other patient developed a retroversion and erosion postpartum. At term she had a healing erosion, her delivery was normal, her perineum intact and her labour lasted 13 hours. Eight patients among the abnormal multiparae developed multiple lesions. Three developed cervical erosion and laceration. All had normal labours and suffered no perineal laceration. At term 1 had a quiescent erosion, the other 2 had cervices already lacerated, 1 had as well a healing erosion and the other a mucopurulent discharge. One patient developed a retroversion and salpingitis superimposed on an already lacerated cervix which was clinically clean at term. She had an instrumental delivery at the end of a labour lasting 38½ hours, her perineum was lacerated. Four patients developed metritis and salpingitis superimposed on an already lacerated cervix which was clinically clean at term. All these patients had normal labours, none of them lasting over 16 hours, and none suffering a perineal laceration.

It is worth noting that of the 33 patients who developed inflammatory lesions 18 had afebrile puerperia.

Signs and Symptoms of Patients with Inflammatory Lesions Spreading to Uterus and Tubes.

Thirteen patients had a low-grade salpingitis at their last postnatal visit. The symptoms of which they complained were:

backache, 2; difficulty in lactation, 6; pain in the side or lower abdomen, 5; discharge, 9; bleeding, 3; and dyspareunia, 1. The tubes were palpable in 10 cases, in all 13 there was definite tenderness on bimanual examination of the fornices, 1 patient had a retroposed uterus and 1 had thickening of the utero-sacral ligaments.

Six patients developed metritis after their confinement. The symptoms of which they complained were: bleeding, 1; pain in the lower abdomen, 5; difficulty in lactation, 4; discharge, 5; weakness, 1; and headaches, 1. The uterus was tender in all 6 cases, subinvoluted once. One patient developed a postpartum monilial vaginitis. She had not suffered from this during her pregnancy.

The difficulty experienced by these patients with lactation was striking and it was found that when the mothers stopped nursing there was a rapid improvement in their pelvic condition.

Assessment of Results.

The first fact that is obvious from a study of these results is that only 2 patients in the normal group developed inflammatory lesions and both these patients had suffered traumatic lesions as well. In the observation or hyperplastic group 2 patients who entered labour with active erosions developed inflammatory lesions though they suffered no trauma. In the abnormal primigravidae nearly half the patients (15) developed inflammatory lesions though only 2 of these patients had suffered traumatic lesions as well. In the abnormal multiparous group about two-thirds (14) developed inflammatory lesions and 8 of these patients had suffered trauma as well.

Of the 23 patients who had no pelvic abnormality at their final visit all had clinically healthy cervices or minor deviations from normal at the last prenatal visit.

While it is admitted that the number of cases is small and figures are often misleading it seems reasonable to conclude that:

1. These cervical lesions constitute a definite danger to the mother and increase her chances of developing a low-grade pelvic infection after confinement.

2. Among abnormal primigravidae the added factor of cervical trauma does not seem to play a very big part.

3. Among multiparae on the other hand the presence of pre-existing trauma and trauma developing at the labour under consideration seem to aggravate the tendency to develop inflammatory lesions and to encourage spread to the uterus and adnexae.

4. An afebrile puerperium is no guarantee that the patient will escape further trouble.

The clinical applications of these findings are:

1. Every patient should have her cervix inspected at each antenatal visit just as faithfully as her blood-pressure is taken. Symptoms may be unnoticed by the patient and lesions may develop during the course of the pregnancy.

2. Every endeavour to improve the condition of the cervix should be made during pregnancy. The treatment found most satisfactory in this clinic was application of penicillin-sulphanilamide powder and vitamin-B therapy.

3. Every patient should be followed up for at least 8 weeks post-partum as spreading lesions may not appear before that period.

4. If a woman with a cervical erosion is seen before marriage everything possible should be done to cure the condition in view of the risk of developing a low-grade pelvic inflammation after a pregnancy.

5. Lactation is often very poor among these patients in the postnatal period. It is amazing how rapidly the pelvic lesions

retrogress and the patients improve in general health when the baby is weaned.

Although no light has been thrown on the cause of these lesions, a study of biopsies throughout pregnancy, the puerperium and postpartum for intervals up to 6 months has revealed something of their progress and nature. It would appear necessary to combine hormonal assays, animal bacteriological experiments and clinical studies to elucidate fully their role in pelvic disease following labour.

Summary.

1. A review of the history and our present knowledge of puerperal infection is given. To date little study of cervical pathology has been undertaken to elucidate the problem of morbidity.

2. Seventy-seven cases were studied throughout pregnancy, in the puerperium and postpartum—of these 12 were normal, 7 cases referred as normal but classified as "For observation", 37 were primigravidae and 21 multiparae suffering from leucorrhoea.

4. pH findings, cells seen in smears from cervix, vagina and urethra, and cultures taken from these areas are described.

5. Biopsies were taken at intervals throughout pregnancy, the puerperium and postpartum. From a study of these, normal changes in the cervix were recognized and are described and 4 deviations from normal are classified and described. They are hyperplastic, proliferative, secretory and mixed types.

6. The antenatal treatment given is reviewed. The best results were obtained with penicillin-sulphanilamide powder applied to the cervix, combined with administration of vitamin B.

7. The condition of the patients at the onset of labour and the complications occurring are described.

8. The nature of the labour and puerperium and any interference and trauma that may have occurred are reported.

9. The condition of the patient and the presence of traumatic or inflammatory pelvic lesions, or of both combined, at the final follow-up visit are described.

10. Conclusions with regard to treatment and prevention are given.

This work has been made possible by a grant from King George V and Queen Mary Maternal and Infant Welfare Foundation. We also wish to acknowledge help from Dr. Phyllis Anderson of the Department of Bacteriology, University of Sydney, in reviewing the bacteriological findings. We further wish to thank the Senior Honorary Obstetricians for permission to take biopsies from their patients during their stay in hospital. We owe a great debt to Sister Downes for her help in the out-patient department.

The photomicrographs were taken by Mr. W. E. Hamilton of Sydney, to whom we are greatly indebted.

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The Range of Blood-Pressure among Women who had a Normal Pregnancy and Confinement

BY

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THE significance which could be attached to high blood-pressures during pregnancy was carefully considered during the planning of the investigation made by The People's League of Health into "The Nutrition of Expectant and Nursing Mothers in Relation to Maternal and Infant Mortality and Morbidity."* The original intention had been to classify as toxaemia (*a*) cases which exhibited hypertension—a systolic blood-pressure of or above 140 mm. Hg, or a diastolic pressure of or above 90 mm. Hg, with or without albuminuria, and (*b*) cases in which there was no hypertension and in which the diagnosis was based upon albuminuria. This was modified since "within recent years, and increasingly since the date at which this investigation was planned and the standard as given above laid down, it has come to be recognized that a diagnosis of toxaemia cannot be based upon hypertension by itself, as this frequently connotes not a true or specific pregnancy toxaemia but an essential hypertension." One of the chief difficulties in attempting to fix a range of blood-pressures that could be regarded as normal for pregnant women was the paucity of data. The number of blood-pressures taken during the investigation was, however, sufficiently large to make an independent study by age and parity of the trend and range of blood-pressures during pregnancy.

THE DATA.

The data are based on the blood-pressures of the women who took part in the nutrition inquiry. These women were booked cases at 10 London maternity hospitals, and had enrolled at the antenatal clinic before the 24th week of pregnancy. In addition to the women rejected from the original inquiry because of some disease or abnormality a further selection was made by excluding all women who did not have a normal confinement or who had toxaemia during pregnancy. All cases of hypertension not accompanied by other symptoms were included since the object of this paper is to examine the range of blood-pressures among women who had an uneventful pregnancy and confinement. No distinction has been made between the 2 groups of women in the original inquiry, and the women who received supplements and the controls have been combined. The numbers which were available for analysis were:

	Primiparae	Multiparae
Number of women	2,538	1,788
Number of blood-pressure observations	20,239	13,678
Average per woman	7.65	7.97

* *The Journal of Obstetrics and Gynaecology of the British Empire*, Vol. LIII, No. 6, December, 1946.

TABLE I.

Systolic Blood-pressure.

No. of weeks before delivery	Primiparae			Multiparae		
	No. of observations	Mean and S.E.	S.D.	No. of observations	Mean and S.E.	S.D.
		Ages under 25				
24 and over	337	120.0±0.65	11.8	81	117.9±1.28	11.5
20–24	465	119.4±0.52	11.2	147	116.7±0.94	11.4
16–20	735	117.5±0.41	11.3	240	117.3±0.73	11.3
12–16	990	117.8±0.34	10.8	309	116.1±0.57	10.0
11–12	283	117.9±0.67	11.2	83	116.5±1.1	10.1
10–11	326	117.0±0.62	11.1	98	116.9±1.18	11.7
9–10	309	117.7±0.57	10.8	86	117.9±0.97	9.0
8–9	369	119.2±0.57	10.9	110	115.4±1.07	10.9
7–8	408	118.9±0.53	10.7	113	116.7±1.09	11.6
6–7	427	119.2±0.52	10.8	121	118.4±1.03	11.4
5–6	510	118.7±0.51	11.6	110	116.4±1.06	11.1
4–5	511	119.0±0.46	10.4	149	117.9±0.94	11.5
3–4	593	119.4±0.44	10.7	166	117.7±0.81	10.4
2–3	641	120.9±0.46	11.7	166	118.4±0.98	12.6
1–2	711	120.9±0.41	10.9	188	119.7±0.75	10.3
0–1	574	121.8±0.49	11.7	157	118.9±0.92	11.5
All periods	8189	119.2±0.12	11.2	2324	117.4±0.23	11.1
		Ages 25–29				
24 and over	442	119.6±0.58	12.2	244	118.4±0.72	11.2
20–24	601	119.9±0.46	11.3	311	116.8±0.59	10.5
16–20	773	119.5±0.42	11.6	501	117.6±0.48	10.7
12–16	1004	119.7±0.35	11.1	617	117.3±0.46	11.4
11–12	272	119.5±0.65	10.6	182	118.0±0.80	10.7
10–11	310	120.2±0.66	11.6	187	117.1±0.79	10.9
9–10	338	119.6±0.61	11.3	198	117.5±0.74	10.4
8–9	346	120.0±0.57	10.5	220	117.6±0.77	11.4
7–8	406	119.9±0.52	10.5	218	118.2±0.75	11.0
6–7	418	121.1±0.56	11.5	239	118.2±0.72	11.1
5–6	512	120.3±0.53	11.9	274	118.1±0.68	11.3
4–5	530	121.1±0.49	11.2	321	118.9±0.64	11.5
3–4	638	121.1±0.46	11.5	336	119.4±0.58	10.6
2–3	653	122.1±0.47	11.9	359	118.8±0.56	10.6
1–2	711	121.3±0.43	11.6	401	118.8±0.60	11.9
0–1	567	123.3±0.50	11.9	354	120.7±0.63	11.8
All periods	8521	120.6±0.12	11.5	4962	118.2±0.16	11.2
		Ages 30 and over				
24 and over	197	121.4±0.78	11.0	358	119.2±0.61	11.5
20–24	243	120.8±0.75	11.8	462	118.2±0.49	10.6
16–20	319	120.6±0.71	12.7	676	118.9±0.46	12.1
12–16	399	120.0±0.61	12.2	798	118.6±0.40	11.2
11–12	113	117.6±1.12	11.9	190	118.4±0.83	11.4
10–11	139	121.0±0.87	10.2	268	117.3±0.69	11.3
9–10	112	120.5±1.23	13.0	249	119.3±0.70	11.1
8–9	164	120.0±0.92	11.8	273	120.1±0.69	11.5
7–8	162	121.7±0.90	11.5	271	118.9±0.67	11.0
6–7	186	120.5±0.84	11.4	337	119.1±0.65	11.8
5–6	206	120.7±0.81	11.6	327	119.2±0.62	11.3
4–5	221	121.2±0.81	12.1	408	120.0±0.59	12.0
3–4	259	121.8±0.76	12.2	419	119.7±0.59	12.0
2–3	275	122.5±0.68	11.3	479	120.4±0.57	12.4
1–2	296	123.3±0.69	11.9	457	121.3±0.56	12.0
0–1	238	123.7±0.76	11.7	420	121.7±0.57	11.7
All periods	3529	120.1±0.20	12.0	6392	119.4±0.15	11.7

Systolic Pressure.

The mean systolic blood-pressure in mm. Hg by age, parity and by length of period before delivery is shown in Table I. This table shows that a gradual but irregular rise in systolic blood-pressure, for both the primiparae and multiparae in each of the 3 age groups, occurred during the last weeks of pregnancy. In each age group the systolic blood-pressure of the multiparae was consistently below that of the primiparae throughout pregnancy. A small progression with age was apparent in the blood-pressures of the multiparae but not for the primiparae and it appears that parity is more important than age in determining the level of the systolic blood-pressure. A comparison of the percentage distribution of the systolic readings during the last 4 weeks of pregnancy is made in Table II.

The 3 age groups were combined, since age had only a slight effect on systolic pressure. Just over one third of the readings of both the primiparae and the multiparae fell within the group 115–124 mm. Hg; 36.2 per cent of the primiparae and 30.6 per cent of the multiparae had systolic pressures of 125 mm. Hg or more.

Table II.

Percentage Distribution of Systolic Blood-pressures During 0–4 Weeks Before Delivery. All Ages Combined.

mm. Hg	Primiparae		Multiparae	
	No. of readings	Percentage	No. of readings	Percentage
Under 95	41	0.67	47	1.20
95–	376	6.11	282	7.23
105–	1234	20.04	956	24.50
115–	2276	36.97	1422	36.44
125–	1548	25.15	847	21.71
135–	554	9.00	284	7.28
145–	92	1.49	46	1.18
155 and over	35	0.57	18	0.46
Total	6156	100.00	3902	100.00

There was little difference in the proportion of women suffering from hypertension in the 2 groups; 2.06 of the primiparae and 1.64 of the multiparae had systolic pressure of 145 and more.

Diastolic Pressure.

The diastolic blood-pressure in mm. Hg by parity, age and length of period before confinement are shown in Table III. The diastolic pressure displayed a trend similar to that of the systolic pressure. An increase in diastolic blood-pressure occurred during pregnancy in each age group of the primiparae and multiparae.

Table IV.

Percentage Distribution of Diastolic Blood-pressure During 0–4 Weeks Before Delivery. All Ages Combined.

mm. Hg	Primiparae		Multiparae	
	No. of readings	Percentage	No. of readings	Percentage
Under 45	9	0.15	7	0.18
45–	76	1.23	65	1.67
55–	848	13.78	561	14.37
65–	2358	38.30	1558	39.93
75–	2086	33.89	1333	34.16
85–	639	10.38	323	8.28
95–	122	1.98	44	1.13
105 and over	18	0.29	11	0.28
Total	6156	100.00	3902	100.00

The primiparae had, for each age group, a larger average diastolic pressure than the multiparae. The percentage distribution of the diastolic blood-pressures during the last 4 weeks of pregnancy for all ages combined is shown in Table IV.

Seventy-two per cent of the primiparae and 74 per cent of the multiparae had a diastolic blood-pressure between 65–84; 2.27 per cent of the primiparae and 1.41 per cent of the multiparae had readings of 95 mm. or more.

TABLE III.

Diastolic Blood-pressure.

No. of weeks before delivery	Primiparae			Multiparae		
	No. of observations	Mean and S.E.	S.D.	No. of observations	Mean and S.E.	S.D.
		Ages under 25				
24 and over	337	68.3±0.57	10.4	81	69.4±1.22	11.0
20–24	465	68.0±0.42	9.1	147	68.0±0.90	10.9
16–20	735	67.6±0.34	9.3	240	68.3±0.59	9.2
12–16	990	68.2±0.29	9.1	309	68.3±0.47	8.3
11–12	283	68.4±0.54	9.0	83	67.1±0.94	8.6
10–11	326	68.4±0.50	9.0	98	68.4±0.90	8.9
9–10	309	69.9±0.58	10.3	86	68.0±0.85	7.9
8–9	369	69.6±0.43	8.3	110	69.1±0.85	8.9
7–8	408	70.2±0.45	9.1	113	68.9±0.91	9.7
6–7	427	70.4±0.45	9.2	121	70.3±0.83	9.1
5–6	510	71.0±0.44	10.0	110	69.6±0.93	9.7
4–5	511	72.5±0.42	9.5	149	71.6±0.74	9.0
3–4	593	72.2±0.42	10.2	166	71.5±0.75	9.7
2–3	641	73.6±0.39	9.8	166	72.6±0.69	8.9
1–2	711	74.2±0.34	9.2	188	72.6±0.65	8.9
0–1	574	75.3±0.43	10.4	157	74.4±0.76	9.5
All periods	8189	70.7±0.11	9.8	2324	70.0±0.20	9.4
		Ages 25–29				
24 and over	442	69.8±0.47	9.9	244	69.7±0.67	10.5
20–24	601	69.9±0.40	9.8	311	69.0±0.52	9.1
16–20	773	69.6±0.33	9.1	501	69.1±0.40	8.9
12–16	1004	69.7±0.30	9.4	617	69.3±0.38	9.4
11–12	272	70.4±0.58	9.5	182	70.3±0.72	9.7
10–11	310	70.8±0.55	9.8	187	68.7±0.60	8.3
9–10	338	70.4±0.51	9.3	198	69.9±0.61	8.6
8–9	346	70.9±0.49	9.0	220	70.0±0.62	9.1
7–8	406	71.9±0.46	9.2	218	70.7±0.59	8.7
6–7	418	72.5±0.45	9.3	239	70.3±0.59	9.1
5–6	512	72.6±0.44	9.9	274	70.9±0.55	9.2
4–5	530	73.4±0.43	9.8	321	72.2±0.51	9.1
3–4	638	74.2±0.38	9.6	336	73.2±0.52	9.4
2–3	653	74.2±0.39	9.8	359	72.5±0.50	9.5
1–2	711	74.7±0.37	9.9	401	73.0±0.50	10.0
0–1	567	76.1±0.40	9.6	354	75.1±0.51	9.6
All periods	8521	72.0±0.11	9.8	4962	70.9±0.14	9.5
		Ages over 30				
24 and over	197	72.2±0.74	10.4	358	71.7±0.52	9.8
20–24	243	71.8±0.62	9.7	462	70.5±0.44	9.5
16–20	319	71.0±0.55	9.8	676	70.5±0.37	9.6
12–16	399	71.1±0.48	9.7	798	70.2±0.32	9.1
11–12	113	71.2±0.94	10.0	190	70.8±0.64	8.9
10–11	139	72.1±0.76	8.9	268	69.9±0.52	8.5
9–10	112	72.6±0.88	9.3	249	71.0±0.57	9.1
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5–6	206	73.0±0.68	9.8	327	72.3±0.48	8.7
4–5	221	73.7±0.72	10.8	408	72.7±0.50	10.1
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1–2	296	76.1±0.60	10.2	457	74.9±0.44	9.4
0–1	238	76.2±0.64	9.8	420	75.2±0.49	10.1
All periods	3529	73.2±0.17	10.0	6392	72.0±0.12	9.5

SUMMARY.

The analysis of 33,917 systolic and diastolic blood-pressures of women who had an uneventful pregnancy and a normal confinement showed:

1. The primiparae had a higher average blood-pressure at each age and at each period during pregnancy than the multiparae.

2. A rise in both systolic and diastolic blood-pressure occurred during the last 2 months of pregnancy among the primiparae and multiparae in each age group.

3. The rise in blood-pressure with increasing age is small.

4. Diastolic pressure is more sensitive than systolic pressure during pregnancy; the average increase was twice as large for diastolic pressure as for systolic pressure.

5. If the normal range of blood-pressure is defined by the mean ± twice the standard deviation then systolic pressures above 145 and diastolic pressures above 95 should be considered abnormal.

The expense of the tabulation of these data was defrayed by a grant from The Welcome Trust, to whom The People's League of Health wishes to express its grateful thanks.

The Committee consisted of: Professor James Young (British Postgraduate Medical School, Hammersmith Hospital), chairman; Miss Margaret Basden (Mothers' Hospital, Salvation Army); Professor F. J. Browne (University College Hospital); Professor Amy Fleming (Royal Free Hospital); Dame Louise McIlroy (Thorpe Coombe Maternity Hospital); W. C. W. Nixon (St. Mary Abbotts Hospital, L.C.C.), Medical Secretary; W. H. F. Oxley (East End Maternity Hospital); L. Carnac Rivett (Queen Charlotte's Hospital) and James Wyatt (St. Thomas's Hospital); and the following: Professor J. C. (now Sir Jack) Drummond (Professor of Biochemistry, University College, London); Miss Letitia Fairfield (Senior Medical Officer, L.C.C.); W. T. Russell and W. J. Martin (Statisticians, London School of Hygiene); Miss Jean Wishart (Queen Mary's Maternity Home); and Miss Olga Nethersole (Founder and Honorary Organizer, People's League of Health).

The Value of the Guterman Test in Threatened Abortion

BY

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THE use of progesterone in cases of threatened abortion is a well-established practice. Its administration was originally based on the work of Knaus (1929) who demonstrated that in the presence of an active corpus luteum of normal cycle or of pregnancy, the spontaneous contractions of the uterus, evident during the follicular phase of the menstrual cycle, cease. Consequently progesterone was considered a "uterine sedative."

But not all clinicians are convinced of the efficacy of progesterone in threatened abortion, and some assert that its administration may even favour progress of the abortion. There is experimental evidence to support these views. Schultze (1931) found that there is a pattern of uterine contractions characteristic of the follicular phase and another pattern characteristic of the luteal phase. The latter is marked by an increase in the amplitude and a decrease in the frequency of the contractions. These findings, which were subsequently confirmed by Moir (1936) and by Henry and Browne (1943), are generally accepted today, and would explain the adverse results which are sometimes seen when progesterone is administered in cases of threatened abortion. In cases where the administration of progesterone has apparently relieved the threat of abortion, its action may have been by virtue of its ability to maintain the decidua and improve the foetal-maternal vascular connexions.

From the standpoint of therapy, therefore, it would be desirable to divide cases of threatened abortion into two groups—(1) those accompanied by evidence of progesterone deficiency, and (2) those not so accompanied. Progesterone therapy might then be limited to cases coming within the first group.

The distinction between the two groups can be made by means of urinary pregnanediol excretion tests.

THE THEORETICAL BASIS OF URINARY PREGNANEDIOL EXCRETION TESTS

The role of progesterone in the physiology of menstruation and reproduction was established by Corner and Allen in 1928. The isolation of pregnanediol from the urine by Marrian (1929) was followed by work establishing this substance as the urinary excretion product of progesterone. Briefly, this point was proved by showing that: (*a*) Pregnanediol excretion coincides with the period of corpus luteum activity in the ovular menstrual cycle (Venning and Browne, 1937); (*b*) In normal pregnancy, when the corpus luteum persists, the execretion of pregnanediol in the urine also persists (Venning and Browne, 1940); (*c*) Administration of progesterone is followed by the appearance of pregnanediol in the urine (Venning, Henry and Browne, 1937).

In 1937 Venning described his gravimet-

ric method of biochemical assay of urinary pregnanediol. Since then many studies have been made of pregnanediol excretion in the urine of pregnant women and non-pregnant women; and the increased pregnanediol excretion in the urine of pregnant women was employed for the diagnosis of pregnancy by several workers, including Hain and Robertson (1939) in this country.

All these workers employed the Venning method of extraction of pregnanediol in the form of sodium pregnanediol glycuronidate, a method which is laborious and time-consuming, requiring a litre of a 24-hour specimen of urine and taking 2 or 3 days to complete.

In 1944 Guterman described the test which bears his name, and which he originally applied to the diagnosis of of pregnancy. The basis of the test is the application of the colour-complex which develops when pregnanediol is dissolved in concentrated sulphuric acid —this colour reaction was originally described by Kober (1931)—to a rapid method of pregnanediol extraction described by Astwood and Jones (1941).

The Procedure of the Guterman Test.

The Guterman test (Guterman, 1944, 1945) consists of 5 steps:

(1) The hydrolysis and extraction with toluene of pregnanediol from a 100 ml. specimen of urine. (2) The precipitation of impurities with 2 per cent sodium hydroxide in absolute methanol. (3) The precipitation of pregnanediol in acetone and N/10 sodium hydroxide. (4) The isolation of pregnanediol. (5) The development of a colour-complex when 10 ml. concentrated sulphuric acid is added to the extracted pregnanediol.

A deep yellow to brown colour is "positive", a yellow or colourless solution is "negative." According to Guterman (1946) more than 0.4 mg. pregnanediol in the 100 ml. urine gives a positive test.

The test can be carried out in less than 3 hours, is inexpensive, requires accuracy but no great technical skill, and utilizes a comparatively small amount of urine.

The Application of Pregnanediol Assays to Threatened Abortion.

There is a pattern of urinary pregnanediol excretion in pregnancy despite individual quantitative variations. Up to about the 9th week after the last menstrual period the excretion equals or, more commonly, slightly exceeds that of the height of the luteal phase of the ovular menstrual cycle. After about the 9th week, there is a sharp rise in pregnanediol output which reaches a maximum 2 or 3 weeks before labour, when a decline sets in. Pregnanediol finally disappears from the urine within 5 days of delivery. The sharp rise referred to may coincide with the transfer of the site of progesterone production from the corpus luteum of pregnancy to the placenta, which transfer is now generally held to occur at the 8th/10th week of pregnancy. The decline prior to labour can be ascribed to the gradual degeneration of the placenta at that time.

Clinically, abortion is common at this time of transfer of progesterone production from corpus luteum to placenta, and Browne, Henry and Venning (1939) pointed out that failure to maintain progesterone production during the transfer may be the cause of abortion at this period of pregnancy. Investigating pregnanediol excretion in threatened abortion, they found that persistence of pregnanediol excretion in the urine at a reasonable level was associated with continuation of pregnancy, but that a fall in, or the absence of, excretion was usually followed by abortion.

These observations were confirmed by

Cope (1940) and Hain (1942). But all these workers emphasized the prognostic value of such assays rather than their value as a guide to rational treatment of threatened abortion. To some extent this was inevitable because the method of Venning, which they employed, took 3 or 4 days to complete, and by that time the outcome of the case was usually settled, or at any rate the optimum time for progesterone therapy, if indicated, had passed.

In 1946 Guterman reported on his use of his test in 73 cases of threatened abortion, but he, too, concentrated on the prognostic value of the test. He reported that in 68 out of the 73 cases he had succeeded in giving a correct forecast of the outcome of pregnancy. Where the test was negative, abortion ensued with 1 exception, and where the test was positive, the pregnancy continued with 4 exceptions.

Guterman ascribed these last 4 failures to: (1) Cases where factors other than progesterone deficiency were found responsible for abortion, e.g., fibroids, retroversion. In these cases, abortion occurred despite a positive test. (2) Cases where he had performed only one test. He pointed out that if the pregnanediol output is originally high, as it may be normally after the 12th week, then even after a fall the excretion figure may still be above the maximum level for a negative test. He therefore advised that where the test is positive, but not strongly so, it should be repeated on the following days to see whether excretion is decreasing; which latter would indicate hormonal failure and suggest inevitability of the abortion ensuing.

He further concluded from the last point that it was desirable to apply a method of quantitative assay to his test. This has been done in the present investigation.

The Present Investigation.

The present investigation was undertaken in a preliminary series of 57 cases diagnosed clinically as threatened abortion. Fifty-five of the cases were followed up. It subsequently transpired that an error in diagnosis was made in 14 cases, in most of which the Guterman test, together with either a simultaneous Aschheim-Zondek test or the clinical course of the case, established the correct diagnosis.

The objects of the investigation were:

(1) To evaluate the Guterman test as a practical method of dividing cases of threatened abortion into the 2 groups mentioned previously—those with and those without evidence of progesterone deficiency.

(2) To take advantage of the quickness of the test in order to employ it as a guide, not merely to prognosis, but to treatment of the cases.

The technique of the test as employed in the present investigation was as described by Guterman (1944, 1945, 1946) together with minor modifications kindly described by Guterman in a personal communication. The details of the technique are given in Appendix A.

A quantitative method of assay has been applied to the test by using a Spekker photo-electric absorptiometer. A colour-strength calibration curve is obtained by using measured amounts of pure pregnanediol dissolved in concentrated sulphuric acid, and the strength of any test solution is read off from the calibration curve. The details of this method are given in Appendix B.

In 39 out of the 55 cases an Aschheim-Zondek test was carried out simultaneously, and valuable information was often obtained by comparing the results of the two tests in the same case.

Interpretation of the Test Results.

A negative result, or with consecutive daily tests, a decreasingly positive result, is taken to indicate one of two possibilities.

(1) Firstly, the pregnancy, although still alive, is endangered by progesterone deficiency. This type of case is eminently suitable for progesterone therapy, and it has been found that 10 mg. of progesterone daily is a sufficient dosage to restore the urinary pregnanediol level to a normal figure in most cases.

In the absence of progesterone therapy in these cases there still remains a possibility of spontaneous cure. For instance, Jones and Weil (1938) recorded an interesting case where, after the removal of the corpus luteum of pregnancy on the 58th day after the last menstrual period without interruption of gestation, pregnanediol was absent from the urine for 12 days, after which it reappeared in increasing amounts.

It must also be borne in mind that in some cases of threatened abortion there may be more than one aetiological factor, and that progesterone deficiency may be accompanied by some other fault such as for instance, retroversion. This emphasizes the need for careful clinical examination in all cases for, if a successful outcome is to be obtained, treatment must be directed against all known factors concerned in the abortion.

(2) Alternatively, the negative test may be evidence that the pregnancy is already dead or the condition already irreversible and beyond response to therapy. This emphasizes the point that what is clinically termed " threatened abortion " covers not only the condition of true threatened abortion, but also the condition of threatened expulsion of a missed abortion. It is in the latter category of case that the simultaneous performance of an Aschheim-Zondek test has proved valuable, in that a weak positive or negative Aschheim-Zondek test has demonstrated the true nature of the case.

A positive result, or, in consecutive daily tests, a maintained positive result, indicates that the pregnancy is not threatened by progesterone deficiency. A diligent search should therefore be made for other causes for abortion, general or local.

Possible Causes of False Test Results.

The result of the test may be vitiated under certain circumstances:

(1) *Diuresis.* It was found, by performing the test in 5 cases of normal pregnancy on separately collected portions of the 24-hour specimen of urine, that the concentration of pregnanediol was highest in the first morning specimen, and that in some afternoon specimens the concentration was barely sufficient to give a positive test. For example, in a case of normal pregnancy at 20 weeks, the following results were obtained:

100 ml. first morning specimen of urine —Strong positive (4.20 mg.).

100 ml. late afternoon specimen—Weak positive (0.48 mg.).

100 ml. whole 24-hour specimen—Positive (0.88 mg.).

From this it is apparent that for reliability the first morning specimen of urine must be employed for the test.

(2) *Kidney disease.* Cope (1940) pointed out that the excretion of pregnanediol would be affected by kidney disease and in a case of normal pregnancy with chronic nephritis he found a low pregnanediol excretion. This was confirmed in a similar case which was seen and tested during the time of the present investigation. The urinary pregnanediol was 0.50 mg. in 100 ml. first morning specimen of urine at 16 weeks after the last menstrual period.

(3) *Previous administration of Progesterone.* The administration of progesterone is followed by the appearance of preg-

GROUP I. *Threatened Abortion. Positive Guterman Tests* (28).

Test No.	Date	Guterman test	Aschheim-Zondek Reaction	Progesterone given after test	Aborted	Remarks
39	28/10/46	Positive	Toxic	No	No	Full-time delivery.
50	12/11/46	Positive	Positive	No	No	
54	18/11/46	Positive	Positive	No	No	
57	29/11/46	Positive	Positive	No	No	Retroversion corrected
59	4/12/46	Positive (0.62 mg.)	—			
	5/12/46	Positive (0.86 mg.)	—	No	No	
	6/12/46	Positive (0.86 mg.)	—			
61	12/12/46	Positive (0.52 mg.)	—	No	No	
	13/12/46	Positive (0.62 mg.)	—			
68	18/ 1/47	Positive	—	No	No	Three previous abortions at 10 weeks.
71	18/ 1/47	Positive	—	No	No	After nephrectomy.
73	6/ 2/47	Positive	—	No	No	One previous abortion.
75	10/ 2/47	Positive	—	No	No	
77	13/ 2/47	Positive	—	No	No	
80	17/ 2/47	Positive (0.60 mg.)	—			Retroversion corrected.
	18/ 2/47	Positive (0.68 mg.)	—	No	No	
90	7/ 3/47	Positive	Toxic positive	No	No	
91	10/ 3/47	Positive	Positive	No	No	
106	26/ 3/47	Positive	Positive in dilution	No	No	Twins.
107	28/ 3/47	Positive	—	No	No	
108	1/ 4/47	Positive	Positive in dilution	No	No	
27	25/10/46	Positive	Positive	No	Yes	Retroversion.
52	14/11/46	Positive	Positive	No	Yes	Fibroids.
67	12/ 1/47	Positive	—	No	Yes	Bicornuate uterus, 3 previous abortions.
72	22/ 1/47	Positive	Positive	No	Yes	No cause found.
102	24/ 3/47	Positive	—	No	Yes	Retroversion corrected 3 weeks before test. Hysterosalpingography normal. Three previous abortions.
8	1/10/46	Positive	Positive	Yes	Yes	
28	29/10/46	Positive	Positive	Yes	Yes	
62	13/12/46	Positive	Positive	Yes	Yes	
76	12/ 2/47	Positive	—	Yes	No	Four previous abortions.
103	24/ 3/47	Positive	Positive	Yes	No	
112	2/ 4/47	Positive	Positive	Yes	No	

GROUP II. *Threatened Abortion—Negative Guterman Tests* (11).

Test No.	Date	Guterman test	Aschheim-Zondek Reaction	Progesterone given after test	Aborted	Remarks
11	8/ 8/46	Negative	Positive	No	Yes	
12	16/ 8/46	Negative	Positive	No	Yes	
14	8/10/46	Negative	Positive	No	No	Full-time delivery.
83	27/ 2/47	Negative	Positive	No	Yes	
92	10/ 3/47	Negative	Positive	No	Yes	
113	8/ 4/47	Negative	—	No	Yes	
7	30/ 9/46	Negative	Positive	Yes	No	
25	24/10/46	Negative	Positive	Yes	No	
48	15/11/46	Negative	Positive	Yes	No	
110	1/ 4/47	Negative	Positive	Yes	No	
79	18/ 2/47	Negative	Positive	Yes	Yes	

nanediol in the urine (Venning, Henry and Browne, 1937). The result of the test is therefore vitiated if progesterone has been administered prior to the collection of urine for the test.

Results of the Present Investigation.

The Guterman test was carried out in 57 cases diagnosed clinically as threatened abortion, and 55 of these were followed up. The follow-up extended primarily for a limited period of 6 weeks from the day of the test, because the result of the test was only significant of the urinary pregnanediol level at the time of the test. Fifty-two of the patients were or had been pregnant, and 3 had conditions unassociated with pregnancy.

The series falls naturally into six groups —(1) Threatened abortion—Positive tests (28); (2) Threatened abortion—Negative tests (11); (3) Threatened abortion—Vitiated tests (2); (4) Missed abortion and complete abortion—Negative tests (11); (5) Not pregnant—Positive tests (2); (6) Not pregnant—Negative tests (1).

Comment (Group I). In this group of positive tests, of the 22 cases where progesterone was not given, 17 did not abort (in 2 of whom another cause for abortion was found and treated), and 5 did abort (in 4 of whom a possible cause for abortion was later found).

Of the 6 cases where progesterone was given after the test, 3 did not abort and 3 did abort. In the latter, no other cause for abortion was found and it is possible that the administration of progesterone may have accelerated the abortion. However, it should be noted that in 15 of the 17 cases where progesterone was not given and abortion did not follow, as well as in the 3 cases where progesterone was given and abortion did not follow, the cause of the threat to the pregnancy was not discovered.

GROUP III. *Threatened Abortion—Vitiated Guterman Tests* (2).

Test No.	Date	Guterman test	Aschheim-Zondek Reaction	Progesterone given after test	Aborted
47	15/11/46	Positive	—	No	Yes
60	8/12/46	Positive	Positive	Yes	No

GROUP IV. *Missed and Complete Abortion—Negative Guterman Tests* (11).

Test No.	Date	Guterman test	Aschheim-Zondek Reaction	Progesterone given after test	Diagnosis
10	3/10/46	Negative	Negative	No	Missed abortion
18	10/10/46	Negative	Weak positive	Yes	
	16/10/46	—	Negative	—	Missed abortion
33	4/11/46	Negative	Positive	No	Missed abortion
65	15/12/46	Negative	—	Yes	Missed abortion
74	8/ 2/47	Negative	Negative	No	Complete abortion
81	25/ 2/47	Negative	Negative	No	Complete abortion
87	6/ 3/47	Negative	Toxic	No	Missed abortion
94	12/ 3/47	Negative	Negative	Yes	Missed abortion
98	17/ 3/47	Negative	Weak positive	Yes	Complete abortion
111	2/ 4/47	Negative	Negative	No	Missed abortion
118	16/ 4/47	Negative	Negative	No	Complete abortion

Comment (Group II). In this group of negative tests, of the 5 cases where progesterone was given, 4 did not abort and 1 did abort; whereas of the 6 cases where progesterone was not given, 1 did not abort and 5 did.

These figures suggest that where there is evidence of progesterone deficiency in threatened abortion, the prompt administration of progesterone may avert abortion unless the condition is already irreversible, or the progesterone deficiency is not the sole factor favouring abortion.

If progesterone is not given, spontaneous cure may follow, but more commonly abortion ensues.

Comment (Group III.) The test is vitiated by prior administration of progesterone, but it is probably safer to continue giving progesterone in these cases than to discontinue it.

Comment (Group IV). The correct diagnosis in these was established subsequent to the Guterman test by either the result of the Aschheim-Zondek reaction or the clinical course of the case, or both. In some cases progesterone was given on the strength of the Guterman Test result, before the correct diagnosis was established.

It may be difficult in early pregnancy to differentiate between threatened abortion and complete abortion which has occurred before the patient was first seen.

GROUP V.
Not Pregnant. Positive Guterman Tests (2)

Case No.	Date	Guterman test	Aschheim-Zondek reaction
15	9/10/46	Positive	Negative
	16/10/46	Positive	Negative
	1/11/46	Negative	—
22	20/10/46	Positive	Negative

Comment (Group V). These cases both presented a period of 2 months' amenorrhoea followed by slight bleeding at a time corresponding to that of a menstrual period. In both, the uterus was slightly enlarged and softened and a cyst was palpable in 1 ovary. In 1, there were also signs of breast activity with secretion. These were presumably cases of cyst of the corpus luteum. The cysts retrogressed spontaneously over a period of 2 to 3 months and normal menstruation was resumed.

GROUP VI.
Not Pregnant. Negative Guterman Test (1).

Case No.	Date	Guterman test	Aschheim-Zondek reaction
70	16/ 1/47	Negative	Negative

Comment (Group VI). In this case there were no signs of pregnancy, but after one period having been missed, bleeding started when the following period was due. Threatened abortion was suspected. This did not prove the case and the amenorrhoea was probably psychogenic.

DISCUSSION.

This is a preliminary report based on the findings and follow-up in 55 cases diagnosed clinically as threatened abortion, and therefore no conclusions can be drawn statistically from such a small series of cases.

However, the results of this investigation would tend to lend support to the following arguments:

Good results from progesterone therapy in threatened abortion can be expected only in the presence of progesterone deficiency, and provided the condition has not yet reached an irreversible stage. If, therefore, progesterone therapy is to be employed in these cases, a test to demonstrate the presence or absence of progesterone deficiency should be carried out before any progesterone is given empirically.

There is some reason to believe that the administration of progesterone in the absence of any natural deficiency may be followed by acceleration of the abortion.

The majority of cases of threatened abortion are not accompanied by evidence of progesterone deficiency—only 11 out of 39 cases gave negative Guterman test results.

In cases of threatened abortion unaccompanied by evidence of progesterone deficiency, the cause of the threat to the continuation of the pregnancy is more commonly not found (22 out of 28 cases), especially so if abortion does not follow.

The necessity for careful clinical examination in all cases is underlined by the fact that, if there is no progesterone deficiency, another cause for abortion must be sought; while if there is progesterone deficiency it may not be the only factor present favouring abortion.

The employment of simultaneous Guterman and Aschheim-Zondek tests helps to differentiate cases of corpus luteum cyst and of missed and complete abortion from cases of threatened abortion. In the present investigation the application of the information derived from the combined results was delayed by the length of time taken to complete the Aschheim-Zondek test. In some cases this resulted in the pointless administration of progesterone. The substitution of a more rapid gonadotrophin pregnancy test, such as the Xenopus or Friedman tests, would have avoided this difficulty to a large extent.

Summary.

1. A series of 57 cases, diagnosed clinically as threatened abortion, were investigated by means of the Guterman test and 55 of these were followed up.

2. The Guterman test is a rapid, practical and economical method of distinguishing those cases of threatened abortion which are accompanied by progesterone deficiency (as reflected in the urinary pregnanediol excretion), and which therefore are likely to benefit from progesterone therapy.

3. There is some reason to believe that the administration of progesterone in threatened abortion unaccompanied by progesterone deficiency, may accelerate abortion.

4. The simultaneous performance of the Guterman test and a rapid gonadotrophin pregnancy test may differentiate other conditions, notably corpus luteum cyst, from threatened abortion.

APPENDIX A.

The Technique of the Guterman Test.

A. *Hydrolysis and Extraction of Pregnandiol.*

1. 100 ml. urine (first morning specimen), 50 ml. toluene, 10 ml. concentrated hydrochloric acid, and two glass beads are added to a 500 ml. flat-bottomed Florence flask.

2. The flask is connected *via* a one-holed cork stopper to a vertical Leibig condenser (water-cooled, 400-500 mm. length jacket) and the mixture is boiled vigorously over an electric hotplate for 15 minutes.

3. The flask and its contents are brought to room temperature by cooling under the water-tap.

4. The mixture is transferred to a 500-ml. separatory funnel and the lower layer (urine) is drawn off.

5. The toluene layer and emulsion are washed twice with 15-ml. portions of N/10 sodium hydroxide and then twice with 15-ml. portions of distilled water.

B. *Precipitation of Impurities.*

1. The washed toluene and emulsion (A-5) are transferred to a 125-ml. Erlenmeyer flask with two glass beads.

2. The mixture is boiled over an electric hotplate (in the hood).

3. When the water has evaporated and the toluene mixture is boiling smoothly, 10 ml. of 2 per cent sodium hydroxide in absolute methanol is added (see note 1 for the preparation of this solution).

4. The mixture is evaporated until a granular precipitate appears and one half of the original toluene volume is reached.

5. The toluene mixture is then filtered while hot through a fritted glass filter (medium porosity, Pyrex) with mild suction. If the filtrate has an orange pink or brown tinge, B-3, B-4 and B-5 must be repeated until the filtrate is yellow or yellow-green.

6. The precipitate of B-5 is washed with 15 ml. hot toluene.

7. The combined filtrates of B-5 and B-6 are evaporated to dryness over the hotplate (in the hood), a gentle stream of air being used to drive off the last traces of toluene. This avoids charring of the residue.

C. *Precipitation of Pregnanediol.*

1. Acetone 5 ml. is added to the residue (B-7) and the mixture is warmed over a hotplate until the solution is complete.

2. N/10 sodium hydroxide 20 ml. is added slowly and the mixture is brought just to boiling on the hotplate.

3. The flask is then placed in a refrigerator (5°C.) for 1 hour. For quantitative recoveries it is preferable to refrigerate overnight.

D. *Isolation of Pregnanediol.*

1. The mixture C-3 is filtered through a fritted glass filter with mild suction.

2. The precipitate is washed with 15 ml. distilled water.

3. The receiving flask is changed, and 10 ml. hot absolute alcohol is passed through the fritted glass filter to dissolve the precipitate.

4. The alcohol filtrate (D-3) is evaporated to dryness from the receiving flask over an electric hotplate (in the hood).

E. *Colour Development.*

1. Ten ml. conc. sulphuric acid is added to the residue (D-4) and the colour is observed in the flask when solution is complete. Colourless to light yellow solution is read as negative. Deep yellow to orange and orange-brown is read as positive.

Note 1. Preparation of the 2 per cent sodium hydroxide in absolute methanol solution.

1. Sodium hydroxide pellets are dissolved in absolute methanol in a dry Erlenmeyer flask to a concentration of 4-8 per cent.

2. The mixture is filtered through a *dry* sintered glass filter to remove the precipitated carbonate.

3. The sodium hydroxide concentration of the filtrate is determined by titration with N/10 sulphuric acid.

4. The filtrate is then adjusted to a concentration of 2 per cent with absolute methanol.

5. The solution is freshly prepared every week.

Note 2.

New reagent solutions should be tested for their production of spurious colours. Each solution, in the volume employed in the test, is evaporated to dryness in the hood. Ten ml. concentrated sulphuric acid is added to the cooled residue of each solution. If a colour reaction is obtained, the reagent must be discarded.

APPENDIX B.

Quantitative Method of Pregnanediol Assay.

1. Make a solution of pure pregnanediol (melting point 235-7°C.) in warm absolute alcohol so that 1 ml. of the solution contains 0.2 mg. pregnanediol.

2. Take aliquots of 1 ml., 2 ml., 3 ml., 4 ml., 5 ml., 6 ml., 8 ml., and 10 ml. of the solution in separate test tubes and evaporate each to dryness in a water-bath. Allow to cool.

3. Add 10 ml. concentrated sulphuric acid to each residue. Eight colour-strengths will thus be obtained.

4. From these 8 solutions draw a calibration curve, measuring colour intensity in a Spekker photo-electric absorptiometer using an Ilford No. 601 blue filter. The strength of the solution is plotted against the drum reading of the absorptiometer.

5. After obtaining its drum reading on the absorptiometer, the strength of an unknown solution (E-1 of the Guterman test) may be read directly from the calibration curve.

Note. Use the same bottle of concentrated sulphuric acid for making the test known-strength solutions and for adding to the isolated pregnanediol when performing the Guterman test (E-1). This involves making a new calibration curve whenever a new bottle of the acid is opened.

My thanks are due to Professor T. N. A. Jeffcoate for advice and encouragement. I am indebted to the staff of the Department of Obstetrics and Gynaecology and to

the staff of the Department of Biochemistry, Liverpool University, for valuable assistance. I also have to thank Professor G.F. Marrian (Edinburgh University) for his kindness in sending me samples of pure pregnanediol.

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An Investigation of the Causes of Sterility and Lowered Fertility in West African Negroes

BY

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THE problem of sterility and fertility is second in importance only to that of self-preservation. It is not surprising, therefore, that references to the subject are to be found in literature since man first acquired the art of writing.

In the Bible several references are to be found. The Mosaic laws give strict regulations for the control of venereal disease, and the abstinence from intercourse for 7 days after the cessation of the menstrual flow ensures that in the majority of cases it occurs during the "mid-cycle", which we now know is the most likely period for fertilization to occur. Kurzrok (1928) has pointed out that this law is occasionally responsible for sterility in women with short menstrual cycles, or whose menstrual loss is continued for long periods.

The story of Jacob and Rachael well illustrates the distress which sterility may cause and also the reluctance of the male to admit any responsibility for it:

"And when Rachael saw that she bare Jacob no children, Rachael envied her sister, and said unto Jacob 'Give me children or else I die.'

"And Jacob's anger was kindled against Rachael and he said 'Am I in God's stead, who hath withheld from thee the fruit of the womb?'."

Hippocrates (460–370 B.C.) recognized that uterine displacements, menstrual disorders and excessive fat were associated with sterility in women. For treatment of sterility, he recommended cleanliness, local treatment of the cervical os and, for tamponage, it is interesting to note that, among other ingredients, he mentions sodium carbonate. The value of *coitus a tergo* in uterine displacement was appreciated by the Ancient Greeks. Aristotle was aware of the importance of male sterility and especially mentions drunkards, invalids and old men. The Chinese physicians, too, appreciated the importance of male sterility and instance as causes excessive intercourse, arsenic and mercury (Ploss and Bartels, 1935).

Although the ovary was discovered by Herophilus in 300 B.C., it was not until 1672 that the significance of the ovarian follicle and the ovum was shown by De Graaf. Other milestones were the discovery of the spermatozoids by J. Ham and Leeuwenhoek in 1677, and Spallanzani's proof in 1768 that the spermatozoa were the active fertilizing agents. In 1889, Jaggard taught that anovulatory menstruation was a probability, but scientific proof of this supposition was not forthcoming until 1934 (DeLee, 1938).

It is only in the last quarter of a century that significant progress regarding the investigation of sterility has been made. Rubin (1920) demonstrated a simple method of testing tubal patency, and in the following year Huhner (1921) introduced the post-coital test. The work of Meyer (1913, 1920), Schroeder (1913a, 1919, 1928), Shaw

(1925), Frankel (1910), Novak (1926) and others have established the significance of the menstrual cycle. In 1925 Evans and Burr demonstrated the importance of vitamin E as a factor in the sterility of animals. In 1923 Allen and Doisy isolated the hormone oestrin, and Hisaw (1930) progesterone. Wiesner and Crew (1929) and Aschheim and Zondek (1928) working independently demonstrated the importance of the pituitary on the ovary, and postulated the presence of 2 separate hormones—prolan A and B—acting on it. Ogino (1928) and Knaus (1929) showed that ovulation almost invariably occurs in the mid-cycle.

With the increase of knowledge attained by these and many other workers, the complexity of the subject of sterility is yearly being more appreciated. All authorities now recognize that, in the majority of cases, the problem resolves itself into a number of infertile factors rather than one major factor responsible for sterility. Thus, the importance of a routine and scientific procedure in the investigation of these cases is now appreciated. Particular mention, in this respect, should be made of the work of Lane-Roberts, Sharman, Walker and Wiesner (1939), Williams (1944), and Meaker (1934).

Introduction.

This work was undertaken during an 18 months' military tour of Nigeria. The work in the first half of the tour, and almost exactly half the case-material collected, was undertaken in the coastal capital of Lagos, and the second half was undertaken in the large northern town of Kaduna. As well as a number of inpatients who were investigated, sterility clinics were held, at first weekly, and, as the demand grew, twice weekly.

The literature on the subject of sterility is now very large, and many new theories and refinements have been introduced even since the material for this paper was collected (October 1941 to March 1943). To analyze the literature of sterility is beyond the scope of this paper, and only subjects relevent to the comparison of sterility in white peoples and West Africans are, for the most part, considered.

Lane-Roberts *et al.* (1939) have stressed the confusion which has been caused by lack of clear definition of terms relating to sterility. It is, therefore, of some importance that a clear definition of terms should be stated at the outset:—

Primary sterility is defined as sterility occurring in a marriage of 2 years in which there has been no known conception.

Secondary sterility is defined as a marriage in which there has not, for 3 or more years, been born a viable child, but in which one or more conceptions have occurred.

Absolute sterility. This denotes that an absolute bar to conception exists in either partner.

Relative sterility. No absolute bar is found to conception, but one or more factors which might be responsible for sterility are found.

It is admitted that the 2 latter definitions are open to the criticism that so much depends upon the interpretation of the individual observer, but much of the subject matter of sterility is open to this criticism.

Two-hundred and three cases have been investigated. Seventy-three of these were cases of primary sterility and 130 of secondary sterility. An analysis of the cases does not reveal any striking differences between those seen in the south and those in the north. They are, therefore, considered as a whole. It should, however, be noted that the proportion of the tribes seen in the north is not a true representation of that region. For although the Hausa tribe

predominate in the north, they rarely attend modern hospitals, and hence the Yoruba and Ibo tribes, who have infiltrated to the north with the Europeans, still form the majority of the patients seen.

The circumstances under which the investigations were done did not permit of full investigation being undertaken in all cases. In none were facilities or the required technical ability available for hormonal investigations. Seminal investigations were limited to sperm counts, the presence or absence of motility and the recording of abnormalities such as pus and blood cells. X-rays (e.g. lipiodol injection for tubal patency) were severely limited by wartime restrictions. Also, it was not considered justifiable to ask the laboratories to undertake too many histological sections.

The language problem was not nearly as difficult as might be expected. Apart from those who spoke good English, "Pidgin English" and the help of a nurse interpreter proved satisfactory in the majority of cases. On the whole, histories were well given and the impression was that they were reliable. It was more difficult to obtain the co-operation of the patients to attend for examination, and this especially applied to the men. Hence most of the work was essentially gynaecological. However, as will be shown later, considerable indirect evidence was obtained about male fertility from the polygamous customs of the West African.

It was thought, when the investigation was started, that there would be considerable difference in the aetiology of cases of primary and secondary sterility, but on analysis, the findings in most instances were comparable. Hence it has been decided to submit the material collectively, and to refer to differences between the two groups only when the figures are sufficiently divergent to merit comment.

The customs of the natives and the local conditions are of such importance to this subject that although I fully appreciate that my knowledge of these matters is very limited, owing to the short duration of my stay in West Africa, some impressions at least must be recorded.

Women's status in West Africa is much inferior to that of the men. Marriage is largely a business deal and, the wealthier the man, the more wives he usually has. Wives are treated as servants, and to some extent as beasts of burden. Even the christians have often one christian wife and several others—non-christian. One of my military duties included the censorship of letters, and I was very interested to note that not once did "love" as we know the word in this country enter into any letter between a man and his wife. Terms of affection between two individuals appeared to be restricted to members of the same sex, and yet homosexuality, I believe, was extremely uncommon. Sex and "love" appear to be separate entities to the West African.

There is no doubt, too, that sex-instruction and experience are treated in a very different manner in West Africa. Children at an early age are encouraged to have sexual experiences. Many cases of gonorrhoea were seen in children of 12 years and under, and if pregnancy results it enhances the value of the woman in the marriage market. It is not uncommon to see Miss X announcing with pride in the local newspaper that she has given birth to a son. On the other hand, after marriage, the wife at any rate does not have extra-marital intercourse.

The polygamous customs appear to suit the West African well. The first wife is anxious for her husband to get more wives, for she will then be mistress and the others servants. Also a single woman prefers a man with other wives, for then her duties will be shared and lessened. As well as

household duties the wives are expected to make or cultivate marketable products, and the husbands allow a proportion of their profits to be kept by the women.

Superstition plays a big part in the West African's life. Relative to this subject it may be mentioned that the men commonly believe that they are sterile unless they have had gonorrhoea, and operation has frequently been refused by women on the grounds that once the abdomen has been opened they will never again bear children.

Chivalry towards women does not exist. If there are heavy loads to be carried to and from market, it is the women who do the carrying whilst the husband walks alongside. All weights of any magnitude are carried on the head, and this and the other physical duties which are imposed upon the women give them a regal bearing and fine physique. In the Maternity Hospital at Lagos, there are some 3,000 to 4,000 deliveries per year. The women are usually up washing the babies within 2 hours of delivery, and the average duration of stay for a confinement is 24 to 48 hours. Uterine involution is rapid and genital prolapse almost unknown.

At the beginning of these investigations an attempt was made to determine the significance of tropical disease and past illnesses as a factor contributing to sterility. The attempt had to be abandoned; firstly, because it was found quite impossible to obtain anything like an accurate diagnosis from the histories and, secondly, because it would have entailed so much pathological work investigating all the patients that the work could not have been completed in the time available. Whereas it is true in this country that two diagnoses should not be made to account for symptoms if one will suffice, in West Africa it would be more correct to say that when one has proved that the patient has three or four diseases, one should not be satisfied until several others have been excluded as being the major factor. Therefore, although it is fully appreciated that many tropical conditions may have a bearing on sterility, it was found impracticable to assess the significance of these factors, and only those factors comparable with European conditions are considered.

Diet in West Africa is good and abundant. The staple items of diet are yams, cereals, and an abundance of citrus fruits. Meat is probably scarce. Salt, even in the coastal areas, is scarce and salt rioting occasionally occurs. Malnutrition and deficiency diseases are uncommon. As regards the women there is little pelvic deformity and childbirth is usually easy. There is no doubt that the pithecord type of pelvis is much more common in West African women than in Europeans.

The general fertility of the West African is not high. It is rare for a woman to have more than 3 or 4 children, and the average is 2 or 3. In the Ibo tribe a contributory factor may be that one of their laws is that sexual intercourse is not permitted for 2 years after the birth of a child.

In nearly all the tribes encountered in this survey male circumcision was practised. In the Ibo tribe female circumcision was also performed in all women except those born into Christian families. The object of this ceremony could not be elicited and the conclusion reached was that if there ever had been any specific object in this operation it had long ago been forgotton. The Americans have revived female circumcision as a cure for female frigidity, but apart from the fact that the operation in the Ibo usually includes clitoridectomy, psychological frigidity in West African women appears to be unknown. The most probable explanation is that it is a mild form of vulval fibulation connected with the ensurance of virginity before marriage.

In no case of the present survey did this operation appear to have any bearing on sterility, although a case was seen of a woman married for 2 months in which the operation had extended to fibulation. The vulva was almost completely excised and the vaginal orifice would not admit the little finger.

Summary of Material Obtained.

Length of sterility. The average length of sterility in the primary cases was 6.7 years. In the cases of secondary sterility it was 7.9 years.

Age of patients. In view of the full menstrual, obstetric, and general histories which the patients were usually able to give, it is surprising that less than a third of them were able to state how old they were. Of those who knew their age, it was found that 75 per cent were 30 years of age or under. Sharman (1944) found that in 500 cases of sterility that two-thirds (66.6 per cent) were in the age group 20 to 30. It is perhaps surprising that the West African does not show an even higher comparable percentage of youth as early marriage is the rule rather than the exception. The explanation is probably to be found in the fact that the average length of sterility in this group is 7.44 years.

To estimate an African's age is not easy but, in order that an approximate idea of their age may be given, this has been estimated for the remainder. This was done from their appearance, length of marriage, the number of years since the menarche, etc. As the figures for the known ages tally closely with the above remarks, they will not be considered further.

Menstrual Histories.

Excluding 3 cases of primary amenorrhoea, 20 out of a total of 70 cases of primary sterility and 39 cases of secondary sterility out of 130 knew the age at which menstruation commenced.

The average age at which menstruation started in this total of 59 cases was 14.6 years.

In the 20 cases of primary sterility it was 15.2 years.

In the 39 cases of secondary sterility it was 14.4 years.

Ploss and Bartels (1935), among others, have shown that it is generally thought that menstruation in the African begins at an early age, and Morison (1943) attributed the above figures to the fact that they were sterile women in whom a later menstruation was to be expected. However, on a further analysis of the figures, it was found that in 25 women with secondary sterility, who had previously borne viable children, the average age at the menarche was 14.4 years. Although these figures are too small on which to base definite conclusions, it would appear that it is necessary to taken with reservations the common belief that the menarche commences early in the African, until further reports are available. Kark (1943) and Mills (1937) report similar findings in normal South African girls.

As regards the menstrual cycle it is considered that a variation ranging from 21 to 35 days is normal. Taking this as a basis, it was found that 12 patients with primary sterility and 27 patients with secondary sterility had abnormal menstrual cycles. These cases are subdivided as follows:—

Primary sterility: 12 cases.

	Cause found
3—Primary amenorrhoea	Endocrinal stigmata.
1—Secondary amenorrhoea	Severe ankylostome anaemia.
7—Hypomenorrhoea	4 Endocrinal stigamata. 3 Unexplained.
1—Polymenorrhoea	Unexplained.

Secondary sterility: 27 cases.

7—Secondary amenorrhoea	4 Various causes.
9—Hypomenorrhoea.	3 Unexplained.
	5 Endocrinal stigmata.
	3 Gross pelvic sepsis.
	1 Unexplained.
8—Polymenorrhoea	3 Gross pelvic sepsis.
	5 Unexplained.
3—Metropathia haemorrhagica	Functional.

Dysmenorrhoea in the West African is a common symptom. It was a complaint in no less than 122 cases (60.1 per cent). It was more common in cases of primary sterility (70 per cent) than in secondary sterility (55.4 per cent). Spasmodic dysmenorrhoea was relatively more common in primary sterility, although, in both, congestive dysmenorrhoea predominated.

An analysis of the findings is given below.

It will be seen from the above that in the majority of cases a sufficient clinical cause for the dysmenorrhoea was found, which is in contrast to the findings in the white races.

The Role of Gonorrhoea and Pelvic Infection.

The role which gonorrhoea and pelvic sepsis plays in the West African is derived from the history of gonorrhoea or vaginal discharge, congestive dysmenorrhoea, dyspareunia, history suggestive of salpingitis, postabortal or puerperal fever, the tubal patency test, the findings of a pathological discharge and other clinical and operative evidence of pelvic infection. A tabulated summary shows the significance of these factors as a cause of sterility in the West African:—

		Per cent
History of gonorrhoea in women		18.7
History of gonorrhoea in men	(79 cases)	72.3
History of vaginal discharge		67.5
History of congestive dysmenorrhoea		37.9
History of dyspareunia		29.2
History suggestive of pelvic infection		40.0
Pathological vaginal discharge		64.5
Clinical evidence of salpingitis		29.6
Proved gonorrhoea	(148 cases)	13.5
Pus cells in cervical smear	(148 cases)	58.8
Negative tubal patency	(85 cases)	59.5
No evidence of gonorrhoea or sepsis in either partner		12.8

It becomes apparent at once on a consideration of these figures that gonorrhoea and pelvic sepsis in the West African are major factors in the aetiology of sterility. So usual is gonorrhoea that there is a common belief that the West African male is not fertile until he has had the disease, and several will give histories of having had anything from 15 to 20 re-infections.

Whereas only 18.7 per cent of the women gave a history of gonorrhoea, 72.3 per cent of the men gave such a history. This may

DYSMENORRHOEA: ANALYSIS OF FINDINGS

	Primary sterility.	*Secondary sterility*
Total complaining of dysmenorrhoea.	50 out of 73 (70 per cent)	72 out of 130 (55.4 per cent)
Spasmodic dysmenorrhoea.	20 cases:	22 cases:
	11 Genital hypoplasia.	4 Genital hypoplasia.
	1 Pelvic sepsis.	7 Pelvic sepsis.
	8 Unexplained.	1 Fibroids.
		10 Unexplained.
Congestive dysmenorrhoea	30 cases:	50 cases:
	22 Pelvic sepsis.	36 Pelvic sepsis.
	1 Genital hypoplasia.	3 Genital hypoplasia.
	4 Endometriosis.	2 Endometriosis.
	5 Unexplained.	1 Fibroids.
		9 Unexplained.

be due to the reluctance of the women to admit having had the disease, but it is far more likely that they do not recognize its symptoms. This suggestion is strengthened by the fact that 67 per cent of them give a history of vaginal discharge and a pathological discharge is found in 64.5 per cent, figures which are comparable with the histories given by men.

Comparable figures are difficult to find in the literature but Schofield (1935) states that gonorrhoea is an important factor in sterility in the East African. Levy and Meyer (1937) and Miller (1944) have shown that venereal disease is much more rampant in the American negro than in the white races. A comparison of the figures of other writers amply confirms that this is so too in the West African. Feiner (1942) found that in 5.8 per cent of cases of sterility there was a history suggestive of pelvic inflammatory disease (cf. 40 per cent present series), and he found clinical evidence of salpingitis in 4.7 per cent (cf. 29.6 per cent). Stein (1938) found an even lower figure (1 per cent) of salpingitis, but Suggs (1943) states that in 12 per cent of his cases he found chronic inflammation and adhesions.

So, also, a comparison of negative tubal patency tests in this series (59.5 per cent) with the published literature is revealing. Different authors' figures vary very considerably, but none approach this percentage. Stein (1938) found that in only 10 per cent were the Fallopian tubes not patent, Green-Armytage (1943) and Meaker (1934) give 14 per cent as an average figure, whereas Feiner (1942) (35.5 per cent) and Sharman (1944) (38 per cent) give a considerably higher figure of non-patency. Rubin (1942), in 3,380 cases, found that the Fallopian tubes were occluded in 29.1 per cent. Thus it would be reasonable to say that from the available statistical results of tubal insufflation about one-quarter were found to be non-patent, a figure less than half of the present series.

In 84 patients tubal insufflation was undertaken. In 8 others it was attempted and proved a failure—usually due to scarring of the cervix. A modified Bonney apparatus without anaesthesia was used.

A further analysis reveals that in 30 (60 per cent) of the 50 patients in whom the tubes were non-patent, a clinically demonstrable pelvic infection was present. In 8 of these patients there was bilateral salpingitis. In 4, unilateral salpingitis and in the 18 other patients evidence such as fixed uterine displacements, tender bulky uterus, etc. It was somewhat surprising to find that in 12 (35.3 per cent) of the 34 women whose Fallopian tubes were patent there was also evidence of pelvic infection. In one (No. 139) there was apparently bilateral salpingitis. It must be conceded that this was probably an error of clinical diagnosis, but in 8 other patients there was evidence of unilateral salpingitis and yet the other Fallopian tube remained patent. Thus, although the proportion of cases with clinical evidence of pelvic sepsis is higher in the cases with a negative tubal patency, it is evident that clinical examination alone is an inaccurate gauge of the probability of tubal occlusion.

The question of undertaking tubal insufflations at all under the circumstances was approached with considerable trepidation. However, confidence was increased with the experience that in no case did it activate a latent infection. It was not undertaken if there was any clinical evidence of acute infection. Thus, if tubal patency tests had been undertaken in all cases, the proportion of those proving negative would probably have been higher. However, this factor is probably not of much importance, as it is rare to see a West African woman with evidence of acute

inflammatory disease. They appear to be able to acquire large inflammatory masses in the pelvis and abdomen with little or no apparent effect on their general health. This characteristic has also been noted by Miller (1940), and Levy and Meyer (1937) in American negroes and by Schofield (1935) in East Africans.

The significance of gonorrhoea in the aetiology of sterility is questioned by few, but its importance in the white races is obviously less than in the West African. It is not possible to say how often gonorrhoea results in sterility. Lane-Roberts *et al.* (1930) state that pelvic inflammatory disease is one of the commonest causes of sterility in women. Reynolds and Macomber (1924) say that gonorrhoea often results in complete sterility. The difficulty of obtaining bacteriological proof of gonorrhoea in women is also universally recognized. Lewis (1943) found only 6 positive results in 80 cases of inflammatory disease, and Mahony (1942) found 21 per cent of 1,598 prostitutes, suspected of harbouring gonorrhoea, to be positive. Miller (1944) states that, when tubal infection has occurred, it is rare to obtain bacteriological proof of the disease. Compared with these findings a positive percentage of 13.5 in 148 routine cervical smears is a high rate, rate, especially when it is taken into account that the vast majority of patients had only 1 cervical smear taken.

Schleyer (1943) found that in 6 women out of 10 who had been cured of gonorrhoea, the Fallopian tubes were closed 3 to 6 months after the infection. He was able to re-open 4 of these 6 with repeated insufflations. It would appear to be most unlikely that anything like the same proportion of West African women have their Fallopian tubes occluded by gonorrhoea, for if this were so the race would soon become extinct. Whether this is due to the undoubted mildness of the average infection in West Africa or that the tubal occlusion is only a temporary matter, it is not possible to say.

Postabortal and puerperal fever are of minor consideration in the aetiology of sterility in West Africa. In the total series only 7 reported any abnormality, one of these being postabortal and the remainder puerperal. In some of these cases it was difficult to be sure that the fever was not due to some other disease—particularly malaria. Puerperal fever was not enencountered by me in West Africa and from discussions with other medical practitioners, it was confirmed that it is a rare disease. Also inquiries from several pathologists appeared to confirm that the haemolytic streptococcus is unknown in Nigeria, and this is probably one of the main factors in the virtual absence of puerperal fever.

It would appear, therefore, that pelvic infection in West African women is largely a result of gonorrhoea. But whereas gonorrhoea is responsible for a great deal of the sterility in the West African, there is evidence to show that each single attack of gonorrhoea has, on the average, not the same power of producing permanent damage as it has in the white races.

Genital Hypoplasia and Endocrinological Factors.

Although these factors are universally accepted as being of great importance in sterility, the difficulty—except in gross cases—is the practical evaluation of their significance. The American school (Lawrence and Rowe, 1928; Rowe, 1930; Haselhorst, 1933) consider that a detailed hormonal analysis is an essential part of the investigation of sterility, but Lane-Roberts *et al.* (1939) do not find these costly and technically difficult procedures to be of practical value as a routine investi-

gation, and found no abnormalities in 17 of 24 patients so examined. Furthermore, from the available figures of published results, it soon becomes apparent that one of the most important factors is the interpretation of the investigator. For example, in assessing cases of uterine hypoplasia, Feiner (1942) reports an incidence of 5.2 per cent; Stein (1938), 12.5 per cent; Suggs, (1943), 32 per cent; and Meaker (1934), 42 per cent.

In the present series it was found that 39 women (19.2 per cent) showed stigmata of maldevelopment or severe genital hypoplasia. As would be expected this condition was more common in cases of primary sterility (37 per cent) than in cases of secondary sterility (9.2 per cent). Of the 12 patients with secondary sterility, half had had 1 early abortion only. Only gross and easily demonstrable cases of hypoplasia were included in this series, and the impression gained was that faults of development were very much more common in the West African than in the white races. As examples:

CASE No. 17 (Fig. 1). Estimated age 20. Married 2 years. History of primary amenorrhoea. Breast development had occurred 6 years ago and for the last 3 years she had had lower abdominal pain at monthly intervals. *Examination*. General appearance very depressed. Height 5 feet. Weight 9½ stones. Well marked breast development. Fat inclined to male distribution. Pubic hair scant. The vulva was moderately well developed anteriorly but deficient posteriorly (Fig. 2). The vagina was represented by a depression one inch deep, at the vault of which was firm scar tissue. *Per rectum*: uterus not felt. Left ovary palpable.

November 28th, 1941. Exploratory laparotomy. Both ovaries were found to be well developed, the left containing many follicular cysts. There were symmetrical bicornuate uteri 4 inches long, and the Fallopian tubes appeared to be of normal development. The distal ends of both uteri terminated in thin cords of fibrous tissue, meeting in the mid-line. The cervix was represented by fibrous tissue some ¾ of an inch in diameter. Left salpingo-oöphorectomy was performed. With the abdomen still open, the patient was then placed in the lithotomy position, and silkworm guide sutures were passed from the vaginal dimple below to the cervix. Sections of the left Fallopian tube and ovary proved to be normal.

December 28th, 1941. Vaginal exploration. After cutting through ¾ of an inch of firm fibrous tissue, a septate vagina about 2 inches long was encountered. The septum and fibrous tissue were excised, and the reconstituted vagina now comfortably accommodated a medium sized Ferguson's speculum.

CASE No. 33. Aged 36. Primary sterility. Primary amenorrhoea. Coitus has been possible but always difficult and painful. Married 7 years. *Examination*. Height, 5 feet 6 inches. Weight, 16½ stones. A very stout woman but alert and energetic. No other stigmata of hypothyroidism. Breasts undeveloped. Abdomen very fat, otherwise normal. Clitoris and labia undeveloped. No pubic hair. The vagina would admit 2 fingers with difficulty, was 2½ inches long, narrowing at its vault to the cervix, which was minute. No uterus could be detected on vaginal or rectal examination.

CASE No. 116. Height, 5 feet 6 inches. Weight, 9 stone. Estimated age 20 years. Married 3 years. Primary sterility. Menstrual cycle normal, with moderate dysmenorrhoea first day of menstruation. No history of gonorrhoea, but vaginal discharge 5 months. No dyspareunia. Husband has one child aged 2 years by other wife. *Examination*. Good physique. Breasts large. The labia minora were attached to each other over an area of ½ an inch at the junction of their anterior and middle thirds. This appeared to be a congenital failure of complete canalization, as there was no scarring or other indication that it was a secondary fusion of the labia. The patient was unaware of anything abnormal. Two fingers could be admitted easily into the posterior compartment of the vagina so formed. Vagina, cervix, uterus and adnexae were normal.

Ide-positive. Endometrium showed well-marked luteal reaction (28th day cycle). *Cervical smear*: some pus cells. No gonococci.

CASE No. 166. Aged 27. Stout. Married 3 years.

Primary sterility. Menarche at 16. Regular cycle of 28 days until marriage, when the cycle varied from 24 to 30 days. Loss for 2 to 3 days. Scanty since marriage. Slight pre-menstrual dysmenorrhoea. *Examination*. Breast development and general body configuration normal female. Moderate under-development of the external genitalia. Clitoris circumcised. Vagina will admit 2 fingers with difficulty. The cervix felt irregular, and on speculum examination was found to consist of 2 distinct and separate cervices. A probe entered both cervices, but could be inserted only 2 to 2½ inches. Tubal patency in both cervices was negative at 200 mm. Hg. Bimanually there appeared to be a uterus bicornuis, and a swelling, the size of a golf ball, was palpable in the left fornix.

Unfortunately, this patient failed to report for uterosalpingography as requested.

CASE No. 201. Aged 20 (estimated). Married 3 years. Primary sterility. Complete amenorrhoea, except that she states she had very slight vaginal bleeding 6 months ago. *Examination*. Immature breast development, but normal female contours, and pubic hair. External genitalia markedly underdeveloped. Vagina will admit one finger only, and is not more than 1½ inches long.

The cervix and uterus could not be felt on bimanual examination.

Information obtained from other practitioners in West Africa, as well as the above illustrations, undoubtedly suggests that all degrees of genital maldevelopment are relatively common in the West African.

It may be argued that 19.2 per cent of hypoplasia in the total series and of 37 per cent in cases of primary sterility does not show any appreciable increase of genital hypoplasia as compared with the white races, especially if the figures of Suggs (1943) and Meaker (1934) are considered. However, it must be remembered that a very high proportion of the total series are sterile on account of gonorrhoea in one or both partners, and that if these cases were eliminated, a much more comparable figure would be obtained. For instance, in only 20 patients with primary sterility can the likelihood of gonorrhoea being a factor be eliminated, and, of these, 13 show stigmata of gross genital hypoplasia, giving a percentage of 65.

Breast development, distribution of fat and pubic hair are usually considered to be of some significance as stigmata associated with endocrinal dysfunction in women. In this series, the significance of these factors appears to be slight or nil. The one possible exception is that, in 8 women, genital hypoplasia was associated with immaturity of breast development. However, there were 13 cases in which breast development was immature and there was no associated genital hypoplasia, and in 23 cases of hypoplasia there was no associated immature breast development. There was no apparent correlation between fat distribution, pelvic contours and genital hypoplasia. In the West African woman male distribution of pubic hair is common and was noted in 44 cases (21.7 per cent). Scant pubic hair seems to be of some endocrinological significance, but male distribution appears to be of no significance as regards sterility, and was noted with equal regularity in the antenatal clinics.

The Role of the Cervix.

Modern literature stresses the importance of the cervix and its secretions in sterility. Green-Armytage (1943) points out that the cervical secretions, at the time of ovulation, become particularly amicable to the reception of spermatozoa. The pH rises to 8.5, the secretion becomes rich in mucin and glycogen and the temperature of the canal rises. He believes that contraception and coitus interruptus interfere permanently with these factors. Lane-Roberts *et al.* (1939) and Van de Velde (1934) stress the importance of skilled courtship in releasing

cervical secretions amicable to fertilization, but consider that the position of the cervix is an even more important factor. Levy and Meyer (1937) give some very conclusive figures showing that endocervicitis and cervical lacerations are about 3 times as common in the white races as they are in the black. Schofield (1935) considers endocervicitis an important factor in sterility, as also does Gardner (1943).

In the present series abnormalities of the cervix were noted as follows: 45 cases of cervicitis associated with lacerations; 9 cases of cervical erosion; 26 cases of infantile cervices; 1 each of the following: prolapse, absence, double cervix, polypus.

Although, in the cases of cervical laceration, it was uncommon to find injuries as severe as are often seen in white persons, the amount of scarring and stenosis was often considerable. In the 92 parous patients who had produced full time foetuses, 48.9 per cent had cervical lacerations. This is appreciably more that the figure of 25.5 per cent for blacks given by Levy and Meyer (1937), but considerably less than the figure of 74.5 per cent which they found in the white races.

Apart from demonstrable clinical lesions of the cervix, further evidence of infection was found in routine examination of cervical smears in 148 patients. As already considered, 13.5 per cent of these had proved gonorrhoea. In 87 patients (58.8 per cent) pus cells were present in the cervical smears and in half of these cases the infection was severe, as judged by there being more than 3 pus cells per high-power field. In many of these, the number of pus cells was very great.

Thus it would appear that cervical lesions play a very considerable role in the aetiology of sterility in the West African, although cervical lesions following childbirth are not so common as in white persons.

Anovulatory Menstruation.

Since Meyer (1913; 1920) and Schroeder (1931a, b; 1928) first scientifically investigated the menstrual cycle, a considerable amount of literature on the subject has accumulated and it is now possible to assess, to some extent, the significance of anovulatory menstruation as first investigated by Novak (1934) and Tietze (1933). Green-Armytage (1943) considers that, in 5 to 10 per cent of women who are sterile, this is probably the important factor, but like others, points out that it is not uncommon for women to have 1 or 2 anovulatory cycles every year. Sharman (1944) in 358 cases found that 11 showed periodic anovulation and 12 persistent anovulation. Only 2 of these 23 patients subsequently became pregnant. Roch, Bartlett and Matson (1939) consider that 4 per cent of cases of sterility are due to anovulation. Effkemann (1939) gives the higher figure of 14 per cent, whereas Williams (1940) found that 17.0 per cent of cases did not ovulate.

In the present series endometrium was obtained for histological examination in 24 cases either by biopsy or curettage. Five of these are disregarded for the present purposes as they were submitted to this investigation for reasons other than anovulation. Out of 19 cases 18 showed normal luteal endometrium, and 1 anovulation on the 25th day of a 30-day cycle (No. 122). The figures are too small from which to draw any definite conclusions but, from the small figures available, it would appear that the incidence of anovulation is comparable with the published figures.

Endometriosis. Endometriosis is difficult to diagnose with any degree of certainty from clinical findings and the history alone, but in many of these cases it was

suspected. In 3 cases it was found at laparotomy and was proved histologically. As only 8 laparotomies were undertaken in the series it strengthens the impression gained that endometriosis is a not uncommon disease in the West African.

Most authorities are agreed that endometriosis is usually associated with sterility. Caffier (1941) found that, in two-thirds of the cases of non-tubal patency upon which he operated, the occlusion was due to adenomyosis. Gardner (1943), however, states that the Fallopian tubes are often patent and that the patients may become pregnant. In the 3 cases of proved endometriosis 1 was found to have patent tubes, in another they were non-patent, and the third case was not tested.

Tuberculosis endometritis. Since these investigations were undertaken, Sharman (1944) has reported an appreciable (5.1 per cent) incidence of tuberculous endometritis discovered on the histological examination of endometrial biopsy specimens. No evidence of a similar nature was found on a re-examination of the 24 endometrial specimens in the present series.

Abortions. Abortions in the West African appear to be as common as they are in the white races. Out of 130 women with secondary sterility 60 had abortions, of whom 37 had had more than one abortion.

It is difficult to assess the importance which syphilis plays in producing abortions in the West African. The Ide test, which, for technical reasons, largely replaces the Wassermann and Kahn tests, is, among other conditions, positive in cases of yaws, encephalitis lethargica and certain phases of malaria. The Ide test was taken as a routine in all cases of admission to the Kaduna hospital. Of the 5,000 most recent admissions it was found that almost exactly one-third were positive. In the present series, out of 44 unselected cases, the Ide test was found to be positive in 22 cases (50 per cent). In those who had a positive Ide test 11 (50 per cent of positives) had had abortions, whereas among the negative Ide cases only 5 (22.7 per cent) had had abortions, suggesting that syphilis may be a factor in the occurrence of abortions in West Africans. Levy and Meyer (1937) have shown that syphilis is more common in the American negro, and although there is little doubt that this, too, applies to the West African, for the reason given, it is not possible to give conclusive proof of this.

There were 8 cases of habitual abortion, in which the patients had had 3 or more abortions without any viable pregnancies.

CASE No. 8. Yoruba tribe. Aged 35. Married 13 years. Height, 5 feet. Weight, 7½ stone.

Menstrual history. Menarche late (? age 20). Normal cycle of 30 days with 5 days loss. During the last 7 years, has had severe premenstrual dysmenorrhoea for 3 days. No dyspareunia. Libido poor, but intercourse occurs about twice a week.

Past history. Gonorrhoea in 1936. No symptoms now.

Obstetric history. Has been pregnant about 10 times, but on each occasion has aborted at 2½ to 3 months. The foetus was sometimes seen.

Examination. Poor physique; thin; breasts lax; male tendency to distribution of fat, pubic hair and pelvic outline. Pelvic organs normal except for a pinhole os, which would not admit the endometrial-biopsy curette. Cervical smear: Many epithelial cells and some pus cells. Numerous mixed organisms, but no gonococci. One morphologically normal spermatozoon seen. Ide test negative on 2 occasions.

In January 1942 this patient again aborted in the hospital at 2½ months, in spite of inpatient treatment, morphia, corpus luteum extract and Antuitrin "S" therapy. Unfortunately, she had been bleeding for 3 days before she reported.

In 3 cases it was thought that uterine retroversions might be a factor in the repeated abortions (Cases No. 14, 29 and

114). In Case No. 29 a ventrisuspension operation was performed, as in West Africa I was struck by the number of patients who had successfully had children following this simple procedure. In Case No. 114, the patient reported haemorrhage at the 4th month of pregnancy. The retroversion was replaced, maintained with a Hodge pessary, and the pregnancy was known to be progressing satisfactorily at the 6th month. This patient also had a positive Ide reaction and was given treatment. Case No. 69 had severe rectal lymphogranuloma inguinale and eventually died of peritonitis, but this was unconnected with her habitual abortion, as the most recent abortion had been 14 years before. Case No. 177 had developed metropathia haemorrhagica. In cases 35 and 47, no abnormality was found.

Uterine myomata. Fibroids, even sufficiently small not to interfere with pregnancy, are known often to be associated with sterility, and Shaw (1936) points out that myomectomy is often followed by pregnancy in a sterile woman.

In this series 8 cases were diagnosed as having uterine myomata. In no case was the diagnosis confirmed at laparotomy, and it is usually extremely difficult in the African to be sure of the diagnosis. For instance, in 2 other cases in which a diagnosis of fibroids was made pre-operatively, the swellings at laparotomy were found to be painless adnexal inflammatory masses adherent to the uterus. My own experience was that fibroids appeared to be considerably less common in West Africa than at home, but other surgeons with more experience thought that the incidence was approximately similar, although none gave the opinion that they were more common.

The figure of 8 myomata in 203 cases compares with other published statistics in cases of sterility in the white races. Stein (1938) reports 7 cases of fibroids in 200 cases of sterility, and Suggs (1943) reports an incidence of 3.5 per cent. Feiner's (1942) figures, however, are considerably less, and he found only 8 cases in 706 patients.

Levy and Meyer (1937) gave some very extraordinary and conclusive statistics for the incidence of fibroids in the American black races as compared with the white. They found that fibroids were about 7 times as common in blacks, and that whereas in them 16.5 of all admissions to hospital were on account of fibroids, in the white races the incidence was 2.5 per cent. Other American authorities agree that fibroids are much more common in the American negro. As the American negro originally came from West Africa, it would be interesting to speculate what factors are responsible for the divergence of these findings. Diet, modes of life, and psychological factors are probably of considerable importance.

Psychological factors. The psychological factors in sterility, which have received so much attention in European and American literature, are comparatively insignificant in the West African. This is due to the attitude which the West African has to sex. It is true that in some instances contact with western civilization and Christianity has introduced psychological barriers, but this factor is not yet of much importance. Their average attitude towards sexual matters is straightforward and open.

It is true that, in this series, a high proportion of women (29.2 per cent) gave a history of some degree of dyspareunia, but in the majority of cases (65 per cent) an adequate physical cause to account for this was found. No case of vaginismus was encountered. Wittkower and Wilson (1943), have shown the importance which psychological ill-adjustment can play in the aetiology of sterility, and although no

comparable investigations were undertaken, there is no doubt that these factors are not of equal significance in African women.

Male impotence is by no means uncommon in the West African. This is, however, almost invariably due to an organic cause such as sexual excess, alcoholism, syphilis or malaria. In the series under consideration, there was no complaint made of impotence. Lane-Roberts *et al.* (1939) report that it is not uncommon for men to think that they are potent and their impotence is only discovered when they are asked to provide a seminal specimen and no fluid is found in the receptacle. No similar instance was found in the West African. Even such a gross case as No. 4, in which the husband gave a history of gonorrhoea, was found to have epispadias, atrophic testicles and complete azoospermia, nevertheless produced 1.5 ml. of semen for examination.

The male responsibility as a factor in sterility. In recent years the male responsibility as a factor in sterile mating has been more and more recognized, and it is now fully appreciated that the investigation of sterility requires the examination of both partners.

Lane-Roberts *et al.* (1939) point out the extraordinary divergence of published reports on the responsibility of the male in cases of sterility, and attribute this to the reports in some instances being made by gynaecologists, in other by urologists, etc., each tending to stress the importance of their own investigations. Furthermore, they have shown that the results are largely a matter of the opinion of the observer, and the accuracy and technique of the investigations which he undertakes and their interpretation. It has now been generally agreed that the numbers and motility of sperms alone are insufficient evidence of male fertility (Lane-Roberts *et al.*, 1939; Walker, 1946; Seymour, 1939; Moench, 1939; etc.). Abnormal head forms and other factors must be taken into consideration. In spite of this, as recently as 1936 DeLee and Greenhill state, regarding Huhner's test, that "if numerous motile spermatozoa are seen, one knows the husband is satisfactory."

Whitehouse (1935) estimates in 20 to 25 per cent of cases of sterility the male is responsible. Nurnberger (1920) considers that in one-third of the cases the male is absolutely responsible and in another third partially responsible. Other reports are: Meaker (1934), 30 per cent; Crossen and Crossen (1941), 30 to 48 per cent; Sharman (1944), 31.6 per cent; Gardner (1943), 40 per cent; Joel and Kenyon (1941), 46.5 per cent; and Williams (1943), 30 per cent. Thus, considering the combined opinion of these authorities, it can be said that the male is responsible for sterility in from one quarter to half the cases.

In the present series it was not possible to undertake detailed seminal examination and, as Schofield (1935) found in the East African, the West African husband was often unwilling to attend for examination. On the other hand, the polygamous practices of the West African give data of considerable value. In spite of the advances which have been made in recent years in the elucidation of male sterility and fertility, the ultimate biological test of fertility is still a more accurate criterion than any laboratory test. The obvious criticism of evaluating male fertility by this method is that there can never be any absolute proof that the husband was responsible for any fertile coitus which occurred. My own impression, however, confirmed by some (and not by others), is that West African women do not have extramarital intercourse after marriage. If there is an appreciable error in estimat-

ing male fertility by this method, it will always be in favour of the husband, as it can be assumed that he has regular intercourse with any wives he may have.

Another difficulty is to arrive at a standard of biological fertility. For example, a man who has several children with 2 or 3 wives cannot necessarily be considered biologically fertile unless he has been responsible for a pregnancy within the last few years. So also, a man with several wives and no children cannot necessarily be considered biologically sterile if one of his wives has recently become pregnant. The standard adopted for biological fertility in this paper is that at least 1 of 2 or more wives has had a pregnancy within the last 2 years. As regards standards of fertility from seminal examinations, this is based entirely on the numbers of spermatozoa and their motility. Summarizing the evidence of male fertility and sterility, the following data are available:

(1) Thirty-five cases were willing to submit themselves to clinical examination. Eighteen abnormalities were found in 14 patients:

Bilateral testicular atrophy or immaturity, 10 (28.6 per cent); gumma of testis, 1; spermatocele, 1; chronic epididymitis, 1; epispadias, 1; active gonorrhoea, 2; soft sores, 2.

Compared with abnormal clinical findings in the white races there is no doubt that the incidence of abnormalities found is high. Jeffcoate (1946) found that 26 men out of 208 examined (12.5 per cent) had bilateral testicular atrophy or hypoplasia—as compared with 28.6 per cent of this series. In 8 of the 10 cases of testicular atrophy or immaturity the patients gave a history of gonorrhoea, but it is doubtful whether gonorrhoea ever is itself responsible for this condition. In 6 of these cases seminal examinations were undertaken. In 3 there was complete azoospermia, in 1 marked oligozoospermia with numerous pus cells, and 2 were normal. In the case of gumma of the testis (No. 94) and in the spermatocele (No. 167) there was also azoospermia.

In view of the prevalence of gonorrhoea, it is surprising to find only 1 case with evidence of chronic epididymitis. Reynolds and Macomber (1924) found that gonococcal epididymitis occurred in 20 to 30 per cent of all cases of gonorrhoea in men. Thus the picture in the West African is again, in this instance, very different.

(2) In 43 patients, seminal examinations were undertaken. The analysis of the results was as follows:

Satisfactory (numbers of spermatozoa and motility) 31. Azoospermia, 10. Extreme oligozoospermia, 2.

Thus in 12 cases (27.9 per cent of cases) the male was found to be certainly sterile and, by modern methods of evaluation, this percentage would certainly have been higher. Suggs (1943) found that 8 per cent of 96 cases had azoospermia, Williams (1940), 10 cases out of 176 (5.7 per cent), Jeffcoate (1946), 9 per cent, compared with 23 per cent of this series.

(3) As regards biological fertility and sterility in men, taking the standard already defined, evidence was available in 113 cases:

Biologically fertile, 70 cases.

Biologically sterile, 43 cases (38.1 per cent).

(4) In some instances evidence of fertility or sterility is available from both the seminal examination and biologically. In others only one factor is available, and in others neither. Summarizing this evidence:

(1) Seminally fertile	14 cases	
(2) Biologically fertile	55 cases	83
(3) Seminally fertile Biologically fertile	14 cases	

(4) Seminally infertile, Biologically fertile	1 case	52
(5) Biologically infertile	33 cases	
(6) Seminally fertile, Biologically infertile	7 cases	
(7) Seminally infertile, Biologically infertile	3 cases	
(8) Seminally infertile	8 cases	
(9) No evidence available	68 cases	

Thus in 135 cases in which evidence of male fertility or sterility is available, 52 (38.5 per cent) show evidence of infertility or sterility. In 1 man (No. 202), the seminal examination showed azoospermia, and yet another wife had had a child 2 years ago. Either his sterility must have been acquired during that time, or else the child cannot have been his. In 7 cases the male was seminally fertile and yet biologically infertile. Several interpretations may be placed on these findings, but the following appear to be the most probable:

(1) The women were sterile (probably gonorrhoea) but the male was not.

(2) A more detailed examination of the semen might have shown infertility factors, although it should be noted that the majority of these patients had at some time had children, although not within the last 2 years (Nos. 9, 41, 49, 106, 131, 139 and 200).

Thus it may be concluded that the male partner in a West African marriage is in many cases responsible for sterility. The considerably higher proportion of cases with azoospermia suggest that his responsibility is even greater than in the white races. The biological test also shows how much he is implicated.

The clinical picture as a whole. One of the problems in assessing sterility is that there are so many factors involved that it is difficult to give a composite picture and compare the findings with other writers. So far, each individual factor has, as far as possible, been analyzed and the results compared with those of others. It is felt that a truer picture of the whole is obtained if a few typical cases are cited.

CASE No. 4. Height, 5 feet 6 inches. Weight, 7½ stones. Estimated age, 25. Married 5 years. Four years ago delivery of a full-time female child which died when 15 days old. Puerperium normal. No other pregnancies. Menstrual cycle has been a 17-day one for last 6 months. Before that 25-day. Average loss for 3 days. No dysmenorrhoea or dyspareunia. Libido fair but intercourse takes place only about 3 times per month. States she has not had gonorrhoea but a vaginal discharge has been present for 3 years. *On examination.* A thin, apathetic, ill-looking woman. Breasts—lax. Pubic hair and fat distribution—male tendencies. Clitoris and labia small. Cervix multiparous, elongated, very posterior and tender. Uterus—rather small. No swelling felt in fornices, which were tender. Thick white vaginal discharge. Cervical smear—pus cells +, epithelial cells +, numerous mixed organisms. No gonococci seen. Husband—has no other wives. History of gonorrhoea 4 years ago and occasional stinging pain on micturition still. Secondary sex characteristics normal.

Penile epispadias. Testicles small. Seminal examination—1.5 ml. semen. Azoospermia. Seven to 8 pus cells per high-power field.

Comment. A typical West African case of sterility. The azoospermia is a complete cause of sterility, but there are many other factors which might be responsible if this one factor had not made further investigation useless.

CASE No. 13. Yoruba tribe Age 30. Height 5 feet 2 inches. Weight 12 stone. Married 10 years but only 1 year with present husband. Primary sterility. Menstruation did not start until she was 20 but has been normal since. Slight abdominal pain after intercourse, which occurs about twice weekly. History of gonorrhoea 4 years ago. (Not with present husband). Complains that for some time she has been troubled with intestinal worms.

On examination. She was a large, stout woman. Nothing abnormal was found in the pelvis. The cervix would not admit the endometrial curette.

FIG. 1.

CASE No. 17. Uterus bicornis, semi bicollis. Note the well developed breasts, scant pubic hair and absence of female pelvic contour.

R.M.

FIG. 2.

CASE No. 17. Note the normal development of the vulva anteriorly and its deficient development posteriorly.

R.M.

Cervical smear—Numerous epithelial cells, no pus cells, mixed organisms +,+, no gonococci. The husband was aged 36, of good build and had 5 children by other wives, the youngest 3 months old. On clinical examination he was normal.

The patient's stool was heavily infected with ova of ascaris and she was given 2 treatments with chenopodium and magnesium sulphate mixtures. Soon after this she missed a period—3 weeks overdue—but then aborted. A month later the Fallopian tubes were tested and found patent.

Comment. This is apparently a case of a woman 10 years sterile who became pregnant after worm treatment. The taking of the cervical smear and the attempt to pass the endometrial curette may have been factors in assisting impregnation. Her subsequent history is unknown.

CASE No. 26. Aged 28. Primary sterility for 8 years. Menarche aged 15. Cycle 28 to 30 days. Loss 4 to 5 days, excessive. No dysmenorrhoea but severe breast pains for 10 days premenstrually. No dyspareunia, but complains of seminal efflux after intercourse (a common African complaint and associated by them with sterility). Intercourse occurs about twice per week. Past history, severe abdominal pains for 1 month in 1930. No history of gonorrhoea or vaginal discharge. *Examination,* November 29th, 1941. General physique good. Breasts small. Pin-hole elongated os. Left ovary enlarged. Dilatation and curettage: probe entered cervix with great difficulty. Fallopian tubes not patent (24th day cycle). Endometrium showed well-marked secretory phase of menstrual cycle.

The husband has 1 other wife now pregnant and the seminal examination was satisfactory.

December 29th, 1941. Patient now states that she has had considerable abdominal pain for some time.

February 25th, 1942. Laparotomy performed 6 weeks ago by a colleague. Chocolate cyst of left ovary found—proved by section. The patient had had 2 periods in February. On February 1st and 19th both breasts were secreting creamy milk in large quantities and were full and uncomfortable. She was given 5 mg. stilboestrol t.d.s. for 5 days.

March 5th, 1942. Breasts more comfortable but still secreting large quantities of watery milk—a stream 6 feet long could easily be obtained by pressure on them. Tubal patency again tested. Negative at 200 mm. Hg (13th day).

Comment. The combination of tubal occlusion and ovarian endometriosis will account for the sterility. I do not know what hormonal imbalance caused the extreme lacteal secretion in a nulliparous woman, and have not encountered a similar phenomenon before or since.

CASE No. 31. Yoruba tribe. Age 31. Married 2 years. Menarche aged 15. Cycle normal. Scanty loss. For 3 years has had dysmenorrhoea of a congestive type beginning the day before the period and lasting 3 days. Has had to go to bed with pain and fever. No dyspareunia. Complains of seminal efflux. History of gonorrhoea and white discharge for 3 years. Fourteen years ago had a 3 months' abortion and apparently another 2 months' abortion 3 months ago. Her husband has 3 children by another wife, the youngest aged 4.

On examination a tumour 4 inches in diameter could be felt in the right iliac fossa and in the right fornix, pushing the uterus over to the left.

November 9th, 1941. Right pyosalpinx drained. January 14th, 1942. Wound healed. Nothing abnormal could now be detected *per vaginam.*

Comment. A typical case of a large tubo-ovarian abscess.

CASE No. 32. Yoruba. Normal height and weight. Estimated age 30. Married 15 years. primary sterility. History of discharge 10 years, but not gonorrhoea. Marked frequency of micturition—about 8 times per hour. Husband has 2 children by another wife. *On examination.* Clitoris circumcised (very unusual in a Yoruba). Pin-hole os. Tender over bladder. Cervical smear—Moderate number of epithelial cells, very few pus cells, many mixed organisms, no gonococci. Catheter specimen of urine—many pus cells. No *schistosoma haemotobium.* Numerous gram negative intra- and extra-cellular diplococci. Given a week's treatment with sulphapyridine but, although much improved, the frequency was still present.

Comment. This case is recorded as the only case of gonococcal cystitis encountered.

CASE No. 56. Estimated age 30. Married 11 years. Menstrual history normal. Libido good but intercourse only about twice a month, presumably because the husband has 8 other wives. Between them these wives have 6 children, youngest aged 1 year. The patient had 1 child 11 years ago but it died.

On examination the patient's physique is fair. The breasts are enlarged and pendulous. The vagina is very spacious and easily admits the whole hand although there is no prolapse of uterus or vaginal walls. Cervix thick, large and hard. Discharge excessive. Uterus retroverted, fixed and enlarged to the size of a 4 months' pregnancy. Small fibroids in anterior wall and a large one posteriorly. Adnexae adherent but not tender. Tubal patency positive on left side at 110 mm. Hg.

Cervical smear—pus cells very numerous, intra- and extra-cellular gonococci present.

Comment. In spite of the numerous positive pelvic findings the left Fallopian tube was still undoubtedly patent. The patient would not submit to operation after the gonorrhoea had been treated.

CASE No. 87. Yoruba. Height 5 feet. Weight 8 stones. Age 27. Secondary sterility. Two children aged 5 and 4. Married 4 years. Menarche unknown. Cycle 22 to 25 days. Loss 5 days. Scanty. Some dysmenorrhoea of congestive type. No dyspareunia. Libido good. Intercourse once a week. Husband has 1 other wife with 2 small children.

No history of gonorrhoea but vaginal discharge for last 10 months.

On examination. Good physique. Breasts lax. Male distribution of pubic hair. Moderate vaginal discharge. Cervix multiparous. Uterus retroverted but not fixed. No adnexal swelling.

December 24th, 1941. Cervical smear—a few pus cells, many mixed organisms, no gonococci.

Tubal patency negative at 120 mm. Hg. (10th day cycle). Treatment was commenced with intramuscular injections of sterilized suspension of sulphapyridine tablets, 1 g. daily for 6 days. (This treatment was used a great deal in West Africa as it was found to be very efficacious for cases of gonorrhoea and economical of a drug in short supply. The protein of the tablet or tissue necrosis produced a febrile reaction of 102 to 104°F. and although it invariably caused a massive brawny oedema at the site of the injection and was very painful, suppuration never occurred and the muscle returned to normal within a week.)

February 2nd, 1942. Tubal patency repeated. Positive at 90 mm. Hg. (18th day cycle).

Comment. This case shows that a combination of sulpha drugs and fever therapy may be responsible for successful treatment of non-patent Fallopian tubes. Several such apparent successes were obtained, although it must always be remembered that repeated insufflation alone may be sufficient to establish patency.

CASE No. 91. Yoruba. Estimated age 32. Married 17 years. Two children, aged 16 and 13. Menstrual history normal. No dyspareunia. Intercourse once a week. No history of discharge or gonorrhoea. Husband has 2 other wives. There is 1 child aged 3 months.

On examination the only abnormal finding was a thick infected cervix. Cervix cauterized on 2 occasions. Tubal patency tested on 2 occasions and found to be patent at 40 and 50 mm. Hg. (10th and 16th days). Endometrium shows secretory phase well marked on 23rd day of cycle.

Comment. This shows the rare case in which no definite cause of 13 years' sterility can be found, although even here the infected cervix may be responsible and the man may be subfertile, as although he has a child 3 months old, this is the only impregnation with 3 wives in many years.

CASE No. 94. Ibo tribe. Height, 5 feet. Weight, 8 stones. Primary sterility. Married 2 years 9 months. Menstrual loss excessive. Severe dysmenorrhoea for which she has sometimes to go to bed. No dyspareunia. Complains of seminal efflux. Intercourse twice a week. No history of discharge or gonorrhoea.

On examination. Physique good. Circumcised. Some discharge. Cervix very elongated and pinhole. Uterus and adnexae normal. Cervical smear—epithelial cells +, no pus or gonococci. The husband has no other wives. He has had "about 20 attacks of gonorrhoea."

On examination. Right testicle large. Well-marked epididymitis. Scars on penis left side and

enlarged inguinal glands. Has many other enlarged glands—neck, axilla, etc. Seminal examination—3 ml. opaque watery fluid. A few pus and epithelial cells. Azoospermia. Kahn test—positive.

Comment. An example of complete sterility in the male with little clinical evidence that there is much wrong with the wife.

Case No. 98. Yoruba. Height, 5 feet 2 inches. Weight, 7½ stones. Age 31. Married 11 years. Secondary sterility. Menstrual history normal. One child in 1932. Two months' miscarriage in 1935. Discharge since childbirth in 1932.

On examination. Fair physique. Cervix scarred. Uterus retroverted. No adnexal swelling. Cervical smear—moderate number of pus cells, intra- and extra-cellular gonococci present. Tubal patency negative on 2 occasions (after treatment and cervical smear negative for gonococci). The husband has no other wives and stated he has never had gonorrhoea. On physical examination he was perfectly normal and the seminal examination was perfectly satisfactory.

Comment. A case in which the woman appears to be entirely responsible for the sterility. It is odd that the husband should not get gonorrhoea from a positive case, but there is usually no reluctance to admit the disease.

Case No. 103. Pagan. Height 5 feet 2 inches. Weight, 8 stones. Estimated age 28. Married 10 years. Primary sterility. Menstrual cycle normal. Loss rather excessive. Moderate dysmenorrhoea. Has had dyspareunia for 1 year. No history of gonorrhoea or discharge. Husband has 1 other wife with 2 children, the youngest 1 month old.

On examination no abnormality noted except a pin-hole os. Kahn negative. Cervical smear—a few pus cells, no gonococci.

August 13th, 1942. Dilatation and curettage. Normal secretory-phase endometrium obtained (21st day of cycle). Stool, blood and urine examinations normal.

May 26th, 1945. Normal delivery of full-time child.

Comment. A case comparable to those so frequently seen in this country in which a dilatation and curettage was all that was required after 10 years of sterility. This is one of the few cases on which a follow-up was obtained. Africans are realists. For example one patient seen by chance in the antenatal clinic, when asked why she had not reported as requested, said "Why should I? I came complaining of sterility and there is no need for me to have any further treatment." Case 115 is similar.

Case N. 105. A Baminda of the Cameroons. Height, 5 feet 8 inches. Weight, 9 stones. Estimated age 28. Secondary sterility. 1 child 8 years old and a 2 months' abortion 1 year ago. Menstrual cycle, normal. Two years moderate dysmenorrhoea and 1 year slight dyspareunia. History of gonorrhoea 5 years ago and a vaginal discharge since then. Pneumonia 1 year ago. Husband has 3 other wives with 4 children, and the youngest aged 3.

On examination. Physique good. Breasts lax. Cervix multiparous. On abdominal examination a mass arising out of the pelvis and reaching to the umbilicus could be felt. A depression in the midline suggests that this mass is divided into two halves. To the right there is some tenderness.

Per vaginum. This mass is almost immovable and the uterus could not be detected separately from it. Cervical smear—no pus cells or gonococci.

August 2nd, 1942. Exploratory laparotomy. Bilateral ovarian cysts firmly adherent to small bowel, rectum and pelvic wall. Left cyst removed, leaving some of the posterior wall of the cyst. Right partially removed. Two locules contained old blood. Large, rightsided pyosalpinx entered and drained.

August 19th, 1942. Good progress. Tube out and no abdominal mass felt now. White blood count 15,300; 65 per cent polymorphonuclears. Kahn test—positive. Bowel—ova of ascaris, ankylostomes and trichuria present. Urine—pus cells and red blood cells present. No *schistosoma haematobium*. This patient was again seen by a colleague on April 7th, 1943. She had then a profuse vaginal discharge. Cervical smear contained numerous pus cells and was positive for gonococci. The pelvis was almost clear on

vaginal examination. Given treatment for this fresh infection of gonorrhoea.

Comment. An example of a not unusual type of pelvis found at laparotomy in Africans. Note the numerous other pathological findings.

CASE No. 117. Yoruba tribe. Height, 5 feet 2 inches. Weight, 7 stone. Age estimated at 25. Married 10 years. Primary sterility. Menstrual cycle normal. Loss excessive and always very severe premenstrual and menstrual dysmenorrhoea. Slight dyspareunia for 7 years. Husband has 1 other wife with 2 children, the youngest aged 1 year. No history of gonorrhoea, but some discharge.

On examination. Physique poor. Breasts small. Cervix—small erosion. Slight discharge. The uterus seemed to be about the size of a 3 months' pregnancy. Last menstrual period 3 weeks ago. Uterus not tender and no swelling felt in fornices separate from uterus. Cervical smear—no pus cells, no gonococci. Ide—Negative.

September 11th, 1942. Laparotomy. Many adhesions. Swelling found to be enlarged right ovary containing pus and firmly adherent to back of uterus. The right Fallopian tube was inflamed and bound down by adhesions. This and the right ovary were removed. Adhesions in the region of the left fimbria were broken down and the left Fallopian tube made patent to silkworm gut.

October 26th, 1942. Tubal patency negative at 180 mm. Hg. (13th day of cycle).

February 8th, 1943. Tubal patency negative 6th day.

Comment. Another typical case of pelvic inflammatory disease, the diagnosis being in error pre-operatively. Also illustrates the difficulty of maintaining the re-establishment of tubal patency after operative procedures.

CASE No. 132. A tall thin woman, estimated age 35. Falani tribe. Primary sterility. Married 11 years. Menstrual cycle regular until 1 year ago. Since then has been 3 months without periods on 3 occasions. No dysmenorrhoea. Severe dyspareunia for 6 years. No history of gonorrhoea but discharge excessive for 7 years. The husband has no other wives and would not appear for examination.

On examination. Poor physique. Breasts, pubic hair, pelvis—normal female type. Not circumcised. Vaginal atresia almost complete 3 inches from the introitus. Cervix not felt. No gross abnormality in pelvis. This patient was asked to return for a plastic vaginal operation but failed to return.

Comment. Vaginal atresia is not an uncommon condition in African women, and is of a different type from the congenital variety seen occasionally in this country. There is no hard fibrous or cartilaginous ring felt at the point of stricture. The most likely explanation, which might or might not fit in with this particular case, is that the woman acquired a gonococcal vaginitis before or near puberty and the resulting inflammation led to vaginal atresia. In 1 case this condition was seen in a woman at full time in labour. It was with the utmost difficulty that a minute opening was found with a probe in the vaginal vault. On stretching this with the finger the vaginal wall started to tear and a Caesarean section had to be performed.

CASE No. 134. Hausa tribe. Secondary sterility. One child aged 8. The labour was apparently normal. One year later the uterus prolapsed outside the vulva and has remained there ever since. Husband has 1 other wife and no other children.

On examination. Fair physique. Breasts lax and small. Abdominal muscles good. No abnormality felt on palpation. There is complete uterine prolapse and an ulcer 1 inch in diameter over the cervix. Ide—positive.

September 7th, 1942. Ulcer treated daily with flavine dressings. September 18th. Ulcer healed. Fothergill's operation performed. October 10th, Very satisfactory result.

Comment. Prolapse of all types is extremely rare in African women, and the only 2 cases I saw which required any treatment were complete procidentias. This is probably due to their fine muscular development, the hard work the women have to do

and the fact that they are on their feet in a matter of hours after delivery.

CASE No. 138. Falani tribe. Primary sterility. Married 6 years (2 with present husband). Menstrual cycle normal. For 2 months severe abdominal pains and vaginal discharge. Admitted that she had probably acquired an infection from another man. Husband has 2 other wives but no children. Menstrual history normal.

On examination practically no breast development at all. Ulcer on fourchette. Foul profuse vaginal discharge. Thickening and oedema of vagina, especially posterior wall and extending on to rectum. Glands palpable in both inguinal regions. Cervix feels hard and craggy. Ide—negative. *Schistoma haematobium* in urine. Cervical smear—no gonococci, spirochetes++. This patient was given a course of intramuscular sulphonamide with considerable alleviation of the vaginal discharge, but the vaginal and rectal thickening remained. She was also treated with stovarsol locally and the ulcer and spirochetes disappeared.

Comment. This case illustrates 2 conditions—both of which are quite common in Africans.

1. Lymphogranuloma inguinale. Stammers and Law (1942) wrote an article on lymphogranuloma inguinale in Africans in Sierra Leone. They apparently obtained excellent results in the treatment of this disease with sulphonamide. In Nigeria the results were very poor and many of us considered that if the condition cleared up with sulphonamides it was a soft sore with which we were dealing. If it did not make any difference we diagnosed lymphogranuloma inguinale with confidence.

2. Spirochaetal infection of the lower genital tract. Several of these cases were seen. They responded well to arsenic and the condition appeared to be analagous to Vincent's angina.

CASE No. 143. Ibo tribe. Aged 17. Married 2 years. Primary sterility. Menstrual cycle normal. Moderate premenstrual dysmenorrhoea for 1 week and during menstruation since puberty, which occurred when she was 14. No dyspareunia. Husband has no other wives and would not come for interview.

October 8th, 1942. *On examination* Small woman of fair physique. Breasts undeveloped. Pubic hair and fat distribution—male tendencies. Circumcised. Moderate discharge. Cervix normal. Uterus rather bulky and tender, thickening in left fornix. Cervical smear—no pus cells or gonococci. April 29th, 1943. Examined in maternity clinic—4 months' pregnant.

Comment. Although very incompletely investigated this case is of interest in that in spite of a tender palpable tumour in the left fornix she became pregnant within 2 months. This bears out the previous observation made that a palpable inflammatory mass on one side does not exclude tubal patency on the other.

CASE No. 169. Effik of Calibar. Height, 5 feet 3 inches. Weight, 8 stones. Primary sterility. Estimated age 20. Married 2 years. Menstrual cycle normal. Severe menstrual dysmenorrhoea of congestive type always. Three years ago was in bed for 6 months with severe right-sided abdominal pain.

January 2nd, 1943. Brought into hospital with severe right-sided pain, 3 days anuria and constipation.

On examination. Pubic hair of male distribution. Large abdominal swelling extending from right iliac fossa to the pouch of Douglas. Very tender. Uterus could not be felt because of pain. Treated with hot fomentations and sulphonamides.

January 20th, 1942. Large tubo-ovarian abscess drained abdominally. February 2nd. Tube out. Excellent progress. Slight thickening only felt *per vaginam*.

Comment. One of the very few cases of tubo-ovarian abscess I have seen in a West African with acute symptoms. Although it has not been stressed in her history, one of her chief complaints, even on admission, was sterility.

CASE No. 175. Effik. Estimated age 25. Married 4 years. Primary sterility. Menstrual cycle normal

until 1 year ago, since when she has had secondary amenorrhoea. Always severe dysmenorrhoea. No dyspareunia. Intercourse twice per month. Husband has no other wives.

On examination. Good physique. Mucous membranes very pale. Body fat and pubic hair shows male tendencies. Circumcised. Vagina small. Cervix small. Uterus small and retroverted. Nil in fornices. No discharge. Haemoglobin 35 per cent. Colour index 0.7. Endometrium—absent. Cause of anaemia not found. The patient was given full doses of iron and liver.

June 3rd, 1943. (Colleague's notes.) Three months pregnant.

Comment. A case of severe hypochromic anaemia who responded to treatment and became pregnant.

CASES NOS. 194 AND 195. These are taken together as they are the wives of the same husband.

	194	195
Tribe	Yoruba	Yoruba
Age (estimated)	28	20
Married	12 years	8 years
Menstrual cycle	Normal	Normal
Dysmenorrhoea	8 days premenstrual, of congestive type	4 years menstrual—griping
Dyspareunia.	No	No
Children	1, 7 years old	1, 4 years old
Discharge	For 2 years	Since birth of child 4 years ago
Examination		
Physique	Good	Good
Breasts	Lax	Normal
Pubic hair	Tendency to male	Tendency to male
Vagina	Large, lax, slight cystocele	Normal
Cervix	Large erosion Thick pus Bleeds easily	Small erosion Bleeds easily
Uterus	Bulky Tender	Pulled over to left. Deep in pelvis.
Adnexa	Nil	Nil
Tubal patency	Not done	Negative at 180 mm. Hg.
Cervical smear	Not taken	Moderate number pus cells. No gonococci.

The husband of these 2 cases gave a history of gonorrhoea on 11 different occasions. Seminal examination—283,000 spermatozoa per ml. Motile. A few pus cells.

Comment. There is little doubt that both wives have been sterilized by gonorrhoea after having children. The husband's fertilizing powers appear to be unaffected after 11 infections of gonorrhoea.

SUMMARY.

1. A brief historical survey of sterility is given.

2. Introduction: 203 cases of sterility in West Africans have been investigated. The amenities and restrictions of the investigation are considered. The customs of the natives and the local conditions relevant to the subject are discussed. Differences between European and African modes of life and conduct are considered.

Although tropical diseases may play a considerable part in regard to sterility in the West African, reasons are given why these factors are not considered in this paper.

3. An analysis of the material obtained is presented, each contributing factor of sterility being treated separately. A comparison is made between these findings and the published reports on the subjects.

The following facts emerge:

(*a*) Genital sepsis, for which undoubtedly gonorrhoea is largely responsible, is the major cause of sterility in West Africans. This is due to the prevalence of the disease, but there is evidence to show that each separate infection of gonorrhoea in the West African is less severe than in the European and is less likely to cause permanent damage.

The virtual absence of puerperal and postabortal fever is noted, and reasons given.

(*b*) The prevalent belief that the menarche in Africans starts early in life is questioned. Female genital maldevelopment and immaturity are found to be more common than in European women. Case histories to illustrate this are given.

(*c*) Anovulatory menstruation, endometriosis and tuberculous endometritis occurring in the West African women are compared with the findings in the literature. No conclusive differences are found, but the material obtained for a comparison of these subjects is small.

(*d*) Abortions are found to occur as frequently as in the white races. Habitual aborters are fairly common among West African women. Case histories of these are given. The difficulty of assessing the significance of syphilis in cases of abortion is explained. There is some evidence to show that it may be of considerable importance.

(*e*) Uterine myomata are found to be no more common than in the white races. This finding conflicts with the literature on American negroes, in whom all writers find a marked preponderance of this disease. The American negro comes from the same stock as the West African negro, but no explanation of this finding is obvious.

(*f*) The virtual absence of psychological factors, which play such an important part in cases of sterility in Europe and America, is considered and reasons for this difference given.

(*g*) The male responsibility in cases of sterility in the West African is surveyed. This again demonstrates the importance of gonorrhoea. The polygamous habits of the West African give data of considerable value as regards biological fertility. A limited comparison of biological and laboratory fertility is able to be made. An incidence of 38.5 per cent of male sterility or marked subfertility is found.

4. A selection of typical case-histories is presented, as it is felt that these give a truer picture of the whole aspect of the problem. Comments on each case are appended.

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Calcium and Phosphorus Metabolism in Pregnancy

(A Survey under War and Post-War Conditions)

IV. Calcium and Phosphorus Balances and Antenatal Findings

BY

E. Obermer, M.D., M.R.C.S., L.R.C.P.

In previous papers (Obermer, 1946a, 1946b, 1947) tables have been given showing the calcium intake and output figures of 48 healthy out-patient gravidae (40 primiparae and 8 cases of second pregnancy) who were investigated at roughly 6-weekly intervals throughout pregnancy. These cases were divided into 4 groups: Group I controls; Group II with a supplement of calcium phosphate in 2 different forms; Group III with a supplement of two forms of calcium phosphate together with large doses of Calciferol, and Group IV with varying doses of Calciferol only. The purpose of this preliminary grouping was to contrast the findings on a low calcium and phosphorus intake, with and without the addition of Calciferol, with those of a high calcium and phosphorus intake, also with and without Calciferol. Using the figures grouped in this way certain tentative conclusions were drawn (Obermer, 1947).

In attempting to correlate the antenatal and, later, labour and postnatal findings with the biochemical findings (confined, in this paper, to the calcium and phosphorus balances) it may, however, be useful to extend the grouping, taking 2 further factors into consideration:

(*a*) That Groups II and III cases were given different forms of calcium phosphate. One half were given so-called "colloidol" calcium phosphate made from bone, in the form of "Calfos" tablets, the other half tablets of ordinary calcium phosphate B.P.

(*b*) That there was a wide range of Calciferol dosage in Group IV. Doses of over 10,000 I.U. per day seemed to exert a definite, though inconstant, effect on calcium and phosphorus metabolism. With smaller doses the findings were inconclusive.

In this paper, therefore, it is proposed to divide the findings into the following groups:

Group A. Controls.

Group B. Supplement of "Calfos" tablets.*

Group C. Supplement of "Calfos" tablets together with large doses of Calciferol.

Group D. Supplement of calcium phosphate B.P. tablets.

Group E. Supplement of calcium phosphate tablets together with Calciferol.†

Group F. Supplement of Calciferol only, in varying doses—from 800 to 10,000 I.U.

Group G. Supplement of Calciferol only, in varying doses—from 10,000 to 36,000 I.U. per 24 hours.

Doses per 24 Hours.

*Groups B, C, D, and E	Calcium	Phosphorus
3rd to 5th months	0.64 g.	0.282 g.
6th to 7th months	0.95 g.	0.423 g.
8th month to term	1.26 g.	0.564 g.
†Groups C, and E		Calciferol
3rd to 5th months		18,000 I.U.
6th to 7th months		27,000 I.U.
8th month to term		36,000 I.U.

The net plus or minus balances of both calcium and phosphorus, for each case in each group, have been added up and divided by the number of 48-hour investigations. A mean 48-hour balance has thus been arrived at for each group. In Table I the mean 48-hour figure has been further divided by 2 to give the mean 24-hour balance.

TABLE I.
Mean 24-hour Calcium and Phosphorus Balances of Each Group of Cases.
(Expressed in Grammes)

Group	Number of cases	Number of 48-hour investigations	Mean daily calcium balance	Mean daily phosphorus balance
A	6	27	−0.48	+0.10
B	6	29	−0.08	+0.15
C	7	33	+0.06	+0.32
D	6	26	+0.004	−0.04
E	6	31	−0.004	+0.13
F	10	42	−0.32	−0.002
G	7	38	−0.16	+0.06

It has been necessary to assume that the five or six 48-hour investigations carried out, during the pregnancy of each case, were representative of the whole period. Such an assumption is legitimate only for purposes of comparison and discussion. Longer and more frequent balance periods would be necessary for the figures to be considered conclusive. Certain tendencies, do, however, emerge. Their basic significance to the maternal organism is made clearer by calculating the total maternal loss or gain throughout pregnancy as in Table II.

In the first and fourth columns the figures are arrived at by multiplying the mean daily calcium and phosphorus balances by 280. The foetal requirement figures, in the second and fourth columns, represent a compromise between the figures calculated by Mitchell and Curzon (1939) and those given by Shohl (1939).

The net loss can be expressed in terms of a percentage of the total maternal reserves. For calcium, at any rate, such a figure can be arrived at with relative accuracy, as the skeleton contains 99 per cent of the calcium in the body of the mother. In the case of phosphorus, the percentage is lower—just over 90 per cent. In Table II, however, there is a maternal loss of phosphorus in only 2 out of the 7 groups. No attempt, therefore, will be made to present the phosphorus figures in percentage of maternal reserves. On the other hand there is a maternal loss of calcium in all 7 groups. In the discussion which follows, this calcium loss will be converted into a percentage of the maternal reserves, by accepting Shohl's figure of 1,150 g. as the calcium content of the skeleton of an adult male weighing 66.2 kg. Making a small allowance (5 per cent) for sex-difference in size of bones, this figure will be corrected for the mean weight of each group. For instance, in Group A the mean weight was 56 kg. The calcium skeletal reserve in this group is calculated, therefore to be 975 g.

Groups A, F, and G, will be considered first, as the calcium intake in these groups was equally low, whilst the calcium intake in Groups B, C, D, and E, was high, owing to the generous supplements.

Group A. The maternal loss of 165 g.

TABLE II.

Total Maternal Loss or Gain of Calcium and Phosphorus, throughout Pregnancy, of Each Group. (Expressed in grammes)

Group	Calcium			Phosphorus		
	Balance throughout pregnancy	Content of foetus	Total maternal loss or gain	Balance throughout pregnancy	Content of foetus	Total maternal loss or gain
A	−135	25	−160	+28	14	+14
B	− 20	25	− 45	+42	14	+28
C	+ 17	25	− 8	+90	14	+76
D	+ 1	25	− 24	−11	14	−25
E	− 1	25	− 26	+36	14	+22
F	− 90	25	−115	− 0.5	14	−14.5
G	− 45	25	− 70	+17	14	+ 3

represents 16 per cent of the total calcium reserve in the body.

Group F. As the mean weight of this group was 62 kg. the maternal loss of 115 g. represents 11 per cent of the total calcium reserves. Such a diminution, as compared with A, is not statistically significant. Further, there is a slight phosphorus loss as compared with a slight phosphorus gain in Group A. Thus these figures do not provide evidence that doses of Calciferol smaller than 10,000 I.U. per day exert a definite influence on calcium and phosphorus metabolism during pregnancy —when the calcium intake is subobtimal.

Group G. With a mean weight of 60 kg. a maternal loss of 70 g. represents 7 per cent of the calcium reserves. As there is a slight phosphorus gain in this group, a reduction from 16 per cent (control Group A) to 7 per cent may be considered suggestive, if not conclusive. Hence it is probable that doses larger than 10,000 I.U. per day exert some influence on calcium and phosphorus metabolism, even on a sub-optimal intake of calcium.

Group B. With a mean weight of 60 kg. the maternal loss of 45 g. represents 5 per cent of the maternal reserves. There is also a definite phosphorus gain.

Group C. With a mean weight of 56 kg. the small maternal loss of 8 g. represents less than 1 per cent of the maternal reserves. There is also a gain of 76 g. of phosphorus —much higher than in any other group. This is the only group in which the balance figures nearly reach a theoretically desirable standard. It is probable, therefore, that large doses of Calciferol, together with adequate supplements of an assimilable form of calcium phosphate, are the best way of ensuring calcium and phosphorus retention—in the average pregnant woman on a mixed diet.

Group D. With a mean weight of 54 kg. the loss of 24 g. represents only 2.6 per cent of the maternal reserves. On the other hand, the phosphorus loss is 10 g. over and above the foetal requirements.

Group E. With a mean weight of 50 kg. the calcium loss of 26 g. represents 3.2 per cent of the maternal reserves. This figure is not materially different from the percentage loss in Group D. A definite phosphorus loss in the latter group, however, has been converted into a definite phosphorus gain. As Groups D and E were given the same supplement of calcium phosphate B.P., the figures in these 2 groups suggest (*a*) that calcium phosphate B.P. may be less assimilable than "Calfos" and (*b*) that the Calciferol effect is exerted more directly upon phosphorus than upon calcium metabolism.

ANTENATAL FINDINGS.

As well as the 48 cases dealt with above, 6 further cases were investigated, on one occasion only, during the early part of pregnancy.

The total calcium intake and output figures of these cases have been given in Table I of a previous paper (Obermer, 1946a) (cases 7 to 12). These cases were, of course, not given any supplements of calcium and phosphorus. Their calcium and phosphorus balances are given in Table III.

As the overwhelming majority of the control cases (Group A) and the pre-supplement investigations of the other groups had negative calcium balances, it is reasonable to assume that cases 34, 37 and 44 had similar negative balances to cases 7 and 8 —see Table III. Thus 5 primiparae out of 45, i.e., 11 per cent, had a negative calcium balances (2 definite and 3 presumed) and also had spontaneous miscarriages As this is, probably, a somewhat higher percentage than normal pregnant women, it suggests that a negative calcium balance may

TABLE III.

48-hour Calcium and Phosphorus Balances of Cases Investigated Once Only in the Early Part of Pregnancy. (Expressed in grammes)

Case No.	Date	Week	Calcium balance	Phosphorus balance
7	25.10.1943	9	−0.51	+0.36
8	24. 4.1944	9	−0.93	−0.37
9	19. 5.1944	12	−0.61	−0.16
10	4. 5.1943	20	−0.15	+1.05
11	4.10.1944	9	−0.14	+0.56
12	30. 9.1944	10	−2.17	−0.24

Cases 9, 11 and 12 were evacuated from London and were lost sight of.

Case 10 developed pyelitis of pregnancy, went into hospital and could not be investigated any further.

Case 7 had a spontaneous miscarriage at the 13th week.

Case 8 had a spontaneous miscarriage at the 12th week.

Miscarriages.

Of the 54 cases whose balances have been given above, 45 were primiparae.

In the 40 out of these 45 primiparae who were investigated throughout pregnancy, during the present survey, there were no miscarriages. Three cases out of the 40, however, had previously had spontaneous miscarriages—cases 34 (Obermer, 1946b), 37 and 44 (Obermer, 1947) (cases 37 and 44 one each at 3 months and case 44 two at 3 months).

be one of a large number of factors which predispose towards spontaneous abortion.

It is equally obvious that a negative calcium balance, with or without a negative phosphorus balance, does not necessarily imply the inevitability or even the probability of spontaneous abortion.

The balance figures for cases 34, 37 and 44, during the present survey, are given in Table IV.

On this occasion each of these 3 cases had a normal pregnancy and labour. Though cases 34 and 37 show positive balances of both calcium and phosphorus, case 44 showed a heavy negative balance of both elements.

Intrauterine Death.

Of the 48 cases investigated throughout pregnancy 8 were cases of a second pregnancy. In 6 out of the 8 cases previous

TABLE IV.

Mean Daily Calcium and Phosphorus Balance Figures of Three Cases Referring to Discussion on Miscarriage.

Case No.	Group	No. of investigations	Mean daily calcium balance (g.)	Mean daily phosphorus balance (g.)
34	E	5	+0.35	+0.56
37	F	4	+0.25	+0.60
44	F	4	−0.65	−0.38

pregnancy had been normal and resulted in normal labour and a healthy child.

Two cases had been abnormal during the previous pregnancy. Number 13 had suffered from severe toxaemia of pregnancy, which had been terminated by surgical induction at the 32nd week, resulting in a stillborn foetus weighing 2 pounds 14 ounces.

Case 43 had also suffered from toxaemia in her previous pregnancy, which had been allowed to continue. She was delivered of a 6-weeks premature baby, which died of convulsions after 27 hours.

Both these patients had a successful second pregnancy. Case 43 had an uneventful pregnancy, throughout the period of investigation, a normal labour and a healthy child. Case 13 had a slight rise of arterial pressure at the 30th week, which subsided on rest and diet, but she also had a normal labour and a healthy child.

Case 3, in the Control or A Group, was the only one of this series whose pregnancy did not continue successfully to term. The foetus died *in utero* somewhere between the 31st and 37th weeks. Labour was induced at the 38th week and resulted in a dead foetus of 5 pounds 10 ounces.

The balance figures for these 3 cases are given in Table V.

Though case 3, whose foetus died *in utero*, had both negative calcium and phosphorus balances throughout pregnancy, cases 13 and 43, whose babies survived on this occasion, also showed negative calcium balances. Their phosphorus balances were positive.

It is probable that a disturbance of calcium and phosphorus metabolism may, directly or indirectly, play some part in the mechanism of toxaemia, intrauterine death and unsuccessful nidation. So many factors are involved in these phenomena, however, that it is impossible to assess the importance of any part thus played.

The fact that 3 women, who had previously aborted and 2 women, in whom previous intrauterine foetal death had occurred, went successfully to term, when

TABLE V.

Mean Daily Calcium and Phosphorus Balance Figures Referring to Discussion on Foetal Intrauterine Death.

Case No.	Group	No. of investigations	Mean daily calcium balance (g.)	Mean daily phosphorus balance (g.)
13	B	5	−0.58	+0.015
43	F	5	−0.31	+0.16
3	A	5	−0.41	−0.16

given supplements of calcium phosphate and/or Calciferol, may have nothing to do with these supplements. The element of chance cannot be excluded. Further, the fact that all these cases were singled out for special investigation and treatment may have given them a feeling of security. We do not yet know the physiological effects of the latter, but its importance should not be underestimated. We need the findings of a much larger series than the present one before we can hope to determine the quantitative importance of calcium and phosphorus retention during pregnancy, in these circumstances.

Symptoms During Pregnancy.

In only 2 cases out of the 48 (apart from the intrauterine death in case 3) were there any disturbing symptoms or signs during pregnancy. One case (13) has already been discussed. In another case (39) there was also a rise of arterial pressure in the 26th week, though there were no abnormal symptoms. She was, therefore, made to rest from the 23rd week to the 32nd week at home, and from the 33rd week to the 40th week at Brocket Hall. For 2 weeks of this period she was on a low protein diet.

The mean daily balance figures of this case were:

Case No. 39; Group F.	
Number of investigations	4
Mean 24-hour calcium balance	−0.28
Mean 24-hour phosphorus balance	−0.12

The remaining 45 cases of this series had normal pregnancies. Careful note was taken of minor symptoms. As would be expected, however, no correlation could be found between these symptoms and the calcium and phosphorus balance figures.

In Table VI the cases were classified according to the following criteria:

Nil. No nausea or vomiting. No other symptoms throughout.

Very slight. Nausea only up to the third month. No other symptoms.

TABLE VI.
Symptoms of Pregnancy.
(Total number of cases 48)

Nil.	
Number of cases	14
Percentage of total	29
Very slight.	
Number of cases	19
Percentage of total	39·5
Slight.	
Number of cases	13
Percentage of total	27
More than slight.	
Number of cases	2
Percentage of total	4·5

Slight. Nausea accompanied by actual vomiting and, in some instances, prolonged beyond the third month. Also digestive symptoms, neuritis and other minor disturbances.

More than slight. Symptoms or signs calling for rest in bed, dietetic treatment or other active intervention.

TABLE VII.
General Well-being Throughout Pregnancy.
(Total number of cases 48)

No change.	
Number of cases	27
Percentage of total	56
Increase.	
Number of cases	8
Percentage of total	17
Decrease.	
Number of cases	13
Percentage of total	27

The fact that 73 per cent of these cases experienced no diminution in well-being and 17 per cent an actual increase in well-being is, perhaps, surprising in view of bombing and the many discomforts inseparable from wartime and the immediate post-war period.

SUMMARY.

1. The mean daily calcium and phosphorus balances of 48 healthy pregnant

women are given in tabular form. The figures are divided into 7 groups. A, Controls; B, Supplement of so-called "colloidal" calcium phosphate in the form of "Calfos" tablets. C, Supplement of "Calfos" tablets together with large doses of Calciferol. D, Supplement of calcium phosphate B.P. tablets. E, Supplement of calcium phosphate tablets together with Calciferol. F, Supplement of Calciferol only, in varying doses—from 800 to 10,000 I.U. G, Supplement of Calciferol only, in varying doses—from 10,000 to 36,000 I.U. per 24 hours.

2. From this table a calculation is made of the total material loss or gain of calcium and phosphorus throughout pregnancy.

3. The significance of the above figures is discussed and a further calculation is made showing the considerable degree of depletion of the maternal skeletal stores of calcium in Groups A and F.

Figures for Group G indicate that daily doses of Calciferol above 10,000 I.U. per day probably have some influence on calcium and phosphorus metabolism.

The figures from Groups B, C, D and E confirm the primary importance of a high calcium and phosphorus intake.

The findings for Groups B and C, as compared with D and E, suggest that calcium phosphate in a "natural" form may be assimilated more completely than ordinary calcium phosphate B.P.

4. The calcium and phosphorus balance figures are given for 6 further cases who were investigated, once only, during the early part of pregnancy. Four of these cases were lost sight of, 2 had spontaneous abortions at the third month.

Calcium and phosphorus balance figures are also given for 3 cases (out of the 48) who had previously aborted (spontaneously) but who successfully carried through to term in the present survey.

The possibility is discussed of phosphorus and calcium retention playing some part, among many other factors, in the successful nidation of the ovum.

5. Calcium and phosphorus balance figures are given for 3 further cases of second pregnancy. In 2 of these cases there had been severe toxaemia during the first pregnancy. Foetal death *in utero* had occurred in one and neonatal foetal death in the second. In the third case intrauterine death of the foetus occurred at about the 32nd week of the second pregnancy—during the present survey. This third case belonged to the Control or A Group and showed heavy maternal loss of calcium and phosphorus.

6. Other variables are discussed which which may have been responsible for the successful conclusion of pregnancy and labour in the supplemented cases of this series who had previously aborted or suffered intrauterine or neonatal foetal death.

Stress is laid on the possible importance of emotional factors, in particular a sense of security due to the special interest shown, the special investigations and treatment.

7. Tables of the incidence of minor symptoms of pregnancy are given for the whole series. No correlation could be found between them and the calcium and phosphorus balances.

Details are given, in tabular form, as a contribution to the statistical study of normal pregnancy.

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Vestibular Anus

(Report of a Case)

BY

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ECTOPIC position of the anus in women is not uncommon and there are many reported cases in the literature, although few have been recorded in recent years. The majority of cases are noted in infants, or in association with a pregnancy. This case is unusual in that the patient was aged 53, had had one confinement, and yet the abnormality remained unnoticed until she reported as an out-patient for an entirely different condition.

The cause of the condition is a failure in the development of the urogenital septum, which fails completely to separate the primitive cloaca into the sinus urogenitalis and the rectum. As a result, the cloacal duct persists, and the rectum may open anywhere on the posterior vaginal wall, vestibule or perineum. Other cases are noted where the rectum opens into either bladder or urethra.

Packard and Kirshbaum (1932) report a case in a primipara of 28 years of age, where Caesarean section was done to preserve the rectum intact.

Potts (1932) records a patient who had spontaneous vaginal delivery with an episiotomy. In a series of 8 cases he failed to note any complication of labour in 4 (2 were delivered by Caesarean section and in 2 more the result was unrecorded). If control is normal he suggests that operative measures to correct the deformity are inadvisable.

On the other hand, Cave (1937) has a successful case in a girl of 8, on whom he operated for faecal incontinence since infancy. He states the optimum time for operation is between the ages of 8 and 12 years. He gives the frequency as being between 1/10,000-1/70,000, as estimated by various authors.

David (1937) reports 6 cases in children and describes the operative technique used on 2 of them. He again stresses the point that operative treatment is undesirable if anal control is satisfactory.

Hipsley (1925) records a case where Caesarean section was performed in a primipara, partly for non-fixation of the head after several hours in labour, but mainly to avoid any damage to the levator muscles with possible loss of control. The patient stated she had control, provided the bowels were not loose.

Thompson (1894) records a girl of 19 years treated successfully by surgery.

Brenner (1915) discusses congenital defects of the anus and rectum. He records 10 cases of vulval anus in children, noted from birth up to 14 years of age. Immediate treatment is directed to the relief of any obstructive symptoms. Six children were left for better development to occur, while 4 were operated on with good control resulting in all cases.

Johnston (1946) records the delivery of a primipara with this condition. Forceps delivery and episiotomy were required, the

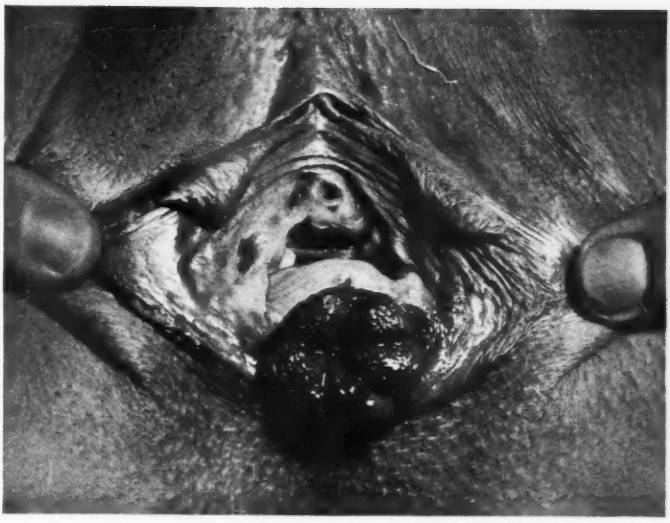

PLATE I. Vestibular Anus.

J.L.W.

child weighed 9 pounds 13 ounces and the rectovaginal septum was undamaged.

CASE REPORT. Mrs. A. T., age 53, was first seen at the out-patient department complaining of irregular discharge and bleeding *per vaginam* which on examination was found to be due to a carcinoma cervicis. The unusual condition of her anus was also noted, and during her treatment for the cervical lesion, an opportunity was taken to examine it more closely (Plate I).

The anal orifice was completely within the area of the vulva, being encircled posteriorly by the fourchette. The rectal mucosa protruded in cauliflower fashion, and no sphincter ani muscle could be detected. The recto-vaginal septum, easily palpated with one finger in the rectum and another in the vagina, was about ¼ inch thick.

The perineum showed no dimple or depression, which is sometimes present to mark the site of the anus, and measured 9 cm. from the fourchette to the tip of the coccyx.

The patient stated that as a child she had attended her doctor because of " something wrong with her back passage." Before marriage she again saw a doctor, who assured her the condition was no bar to matrimony.

Married in 1921, she had a normal delivery of a 7½ pounds child in 1931, after a labour of 20 hours. No perineal sutures were required.

Her sole disability appears to have been that if she took fruit or laxatives she became unable to control defaecation. Normally control of faeces and flatus is perfect.

DISCUSSION.

Abnormalities of this nature are usually noted at birth or during childhood. If overlooked at this time, they are usually observed during the course of a pregnancy.

Operative treatment is indicated only if symptoms of obstruction or incontinence are present. If control of defaecation is normal, most authorities agree that operative treatment is unwise.

When the condition is complicated by pregnancy, it makes an interesting obstetrical problem. Authorities differ as to whether Caesarean section should be performed, or normal vaginal delivery permitted. Certainly recorded cases who have had vaginal delivery do not appear to have suffered any subsequent loss of control. On the other hand, Caesarean section would certainly appear permissible to avoid any possibility of damage and laceration to the levator muscles and rectum.

SUMMARY.

1. A case of vestibular anus is described and some of the literature briefly summarized.

2. The majority of cases have good anal control and do not require operative treatment.

3. Caesarean section appears to have a place in the treatment if pregnancy ensues.

My thanks are due to Mr. Clifford White, under whose care this patient was admitted, for permission to publish this case.

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Cramps in Pregnancy

BY

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CALCIUM lactate has been for many years prescribed for the cramps from which pregnant women suffer. The results of this treatment have not been entirely successful. Several preparations of calcium have been used, with no better results than those obtained with calcium lactate. Some textbooks suggest pressure as a cause of these cramps, but Browne (1946) disagrees with this, and believes that the cause of the cramps is not fully understood. The idea underlying treatment with calcium lactate, seems to be that of a possible parathyroid deficiency. Richter, Holt and Barelare (1938), for example, administered large amounts of a solution of calcium lactate by mouth to parathyroidectomised rats, and found that in every case the symptoms of tetany disappeared. No signs of tetany are present in pregnant women who complain of cramp and the cramps do not disappear in every case following the administration of calcium lactate by mouth.

Glover (1931) found that heat cramps in industry were removed by the ingestion of extra sodium chloride. Marriott (1947) has listed cramps as one of the signs of salt-deficiency. Richter and Barelare (1938) carried out experiments which showed that in pregnant rats the appetite for calcium lactate increased, but not to anything like the same extent as their appetite for sodium chloride. They found that their appetite for calcium lactate increased in the first two-thirds of pregnancy and then fell back to the normal level in the last third of pregnancy. It is in this last third of pregnancy in women that cramps are most troublesome. They also found that in pregnant rats the appetite for sodium chloride began to rise early in the first third of pregnancy and that it continued to rise right up to the end of the pregnancy. The total increase above the normal level in the appetite for calcium lactate was 50 per cent and for sodium chloride 300 per cent. Harding and Van Wyck (1926) found that the sodium chloride level in the blood of pregnant women rose steadily up to the 36th week and then very slowly began to fall. Most of the spontaneous recoveries from cramp in the untreated cases in the present investigation took place between the 36th and the 38th week of pregnancy.

It is not known what part this increased salt-intake plays. The fact that a similar rise in salt-appetite appears after adrenalectomy (Richter, 1936) suggests that the adrenal gland may play an important part in pregnancy. It is known that the adrenal gland enlarges in pregnant women (Dieckmann, 1942). Thorn and Harrop (1937) have shown that a close relationship exists between salt-metabolism and ovarian function.

During an investigation of the part played by hormones in failing lactation, Professor F. G. Young suggested to the investigator that these cramps in pregnancy might be a possible sign of adrenal insufficiency. This idea was based on the work of Richter which is mentioned above. The present investigation was started, there-

* Working with grant from Medical Research Council at St. Thomas's Hospital, London.

fore, under the auspices of the Medical Research Council at St. Thomas's Hospital in February 1945, and ended in September 1946. It began as an attempt to remove any sign of adrenal insufficiency during pregnancy in the hope that this might prevent failure of subsequent lactation.

Definition of Cramp.

Cramp is a painful spasmodic contraction of the muscles of the limbs. During the paroxysm the muscular fibres affected can be felt gathered up into a hard knot. In pregnancy these cramps begin as early as the 20th week or as late as the 36th week. The commonest date of onset is the 28th week. They occur usually during the night but in severe cases may occur during the day as well. In the mildest cases stiffness is the only complaint. This stiffness may or may not be replaced by cramp at a later date. The attacks of cramp may occur several times every night, or as infrequently as an attack once a week. The commonest site of the cramps is in one of muscles or groups of muscles in the legs. The muscles of the hip, thighs and feet are also affected, but those of the arms and hands are rarely involved. These cramps are unlike tetany because they are asymmetrical in distribution, do not cause characteristic postures, and are not accompanied by accessory signs of irritability. There is a tendency for the cramp to recur in the same place. Each attack is acute and of short duration. The spasm in the muscles is brought on by the movement of the part after a period of rest. This is especially noticeable during the night, when, each time the patient moves in bed, the cramp comes on and the pain is so severe that it wakes her up. This complaint is therefore a source of restless nights, and even of insomnia, because the patient is afraid of not lying still. In the day-time the cramp comes on during walking and causes the patient to fall.

Procedure.

Three types of treatment were carried out and a fourth group of patients were left without any treatment in order to provide controls. In all 198 cases were investigated. At first the sodium chloride and the calcium lactate were given to alternate patients. The difference between the results from these 2 treatments was such that it was then decided to use 2 sets of controls alternately with the sodium chloride, and there were 105 controls. Of these controls, 48 were given calcium lactate, 25 had saccharine tablets and 32 were left untreated.

The patients were seen and examined in the antenatal clinic. Treatment was begun the first time the patient came complaining of cramp. Treatment ceased either when the cramp was cured, or in the uncured cases, when labour began. The patients were followed up at each subsequent antenatal visit, and were finally interviewed in the maternity wards after delivery.

The treatments were as follows:

(1) Sodium chloride by mouth.
(2) Calcium lactate by mouth.
(3) Saccharine tablets by mouth.

Materials.

Calcium lactate. This was used in the form of tablets containing gr. 5 of calcium lactate. Two tablets were taken by mouth with water 3 times a day.

Sodium chloride. At first, sodium chloride was used in powder form; gr. 60 was prescribed by mouth, with water twice a day after meals. The taste was objectionable. An attempt was made to disguise this with various flavourings, without success. Therefore, when 53 patients had

been treated with the sodium chloride as powder, a change was made to sodium chloride in tablet form. Forty patients were given these tablets. Each tablet contained 15 gr. of sodium chloride. One tablet was taken by mouth with water 3 times a day after meals.

Saccharine tablets. One tablet was taken by mouth 3 times a day after meals with water.

Results.

The results are shown in Tables I and II.

Duration of treatment. In the cases where the cramps ceased before the end of pregnancy, the mean duration of treatment with both calcium lactate and saccharine tablets, was 3 weeks. The mean duration of treatment with sodium chloride was 1.5 weeks. In the cases that were cured the cramps ceased after 1 week's treatment in the following percentage of cases:

(1) With sodium chloride in 83 per cent.
(2) With calcium lactate in 43 per cent.
(3) With saccharine tablets in 40 per cent.

Table I.

Treatment	Controls			Total cases	Sodium chloride		
	Calcium lactate	Saccharine tablets	Untreated cases		Powder	Pills	Total
Number of cases ...	48	25	32	105	53	40	93
Cured	23	11	15	49	48	34	82
Improved	25	2	16	51	4	6	10
Unchanged	2	12	1	5	1	0	1
Recurrences	6	0	0	6	8	4	12

Table II.

Treatment	Controls			Total cases	Sodium chloride		
	Calcium lactate	Saccharine tablets	Untreated cases		Powder	Pills	Total
Toxaemias	10	7	5	22	7	2	9
Stillbirths	2	0	0	2	3	0	3
Premature infants	2	0	2	4	4	2	6
Primiparae	27	13	14	54	26	17	43
Multiparae	21	12	18	51	27	23	50
Previous toxaemias	0	1	1	2	2	0	2
Number of cases ...	48	25	32	105	53	40	93

Rate of cure. The cramps ceased before the end of pregnancy in 44 per cent of the patients who were given saccharine tablets, in 47 per cent of the patients who had had no treatment, and in 48 per cent of the patients who were given calcium lactate. The cramps ceased before the end of pregnancy in 88 per cent of the patients who were given sodium chloride; in 95 per cent of those who were given it as a powder, and in 85 per cent of those who were given it as pills.

In all but a very few cases, the cramps ceased when the infant was born.

Recurrences of the cramp. There were no recurrences among the cases who had not been given any treatment, nor in the cases who had been given saccharine tablets. There were 6 recurrences among the cases treated with calcium lactate, and 12 among the cases treated with sodium chloride. All but 2 of these 18 recurrences took place during hot weather. Of these 2, one occurred after a severe bout of diarrhoea

and vomiting, and the other occurred in winter in an otherwise healthy patient. Both of them had been treated with sodium chloride.

The subsequent course of the pregnancies. Harding and Van Wyck (1926) say that if salt is freely given in the diet of a normal pregnant woman its effects are neglible; if, however, there is a tendency to toxaemia the condition is intensified. Four of the multiparae in this investigation had had toxaemia in 1 previous pregnancy. In none of them did the toxaemia recur in the present pregnancy, even though 2 of them were given sodium chloride.

The percentage-incidence of the toxaemias was less among the patients who were given sodium chloride than among the patients who were given calcium lactate, saccharine tablets or no treatment at all. The percentage of premature births and stillbirths was about the same among the patients treated with sodium chloride as in the 3 control groups. The percentage of failures to establish lactation was the same in all 4 groups.

Conclusion.

(1) Treatment of the cramps of pregnancy with calcium lactate gives no better results than treatment with saccharine tablets.

(2) In 47 per cent of the untreated cases the cramps ceased before the end of pregnancy.

(3) There were 18 relapses in the whole 198 cases. The relapses in all but 2 cases, occurred in hot weather.

(4) Treatment with sodium chloride cures the cramps of pregnancy in a large percentage of cases. It has no ill effects on either the mother or the infant. It does not increase the incidence of the toxaemias of pregnancy. In 83 per cent of the cases cured the duration of the treatment was less than 7 days.

(5) The fact that an increased salt-intake cures the cramps of pregnancy may mean that these cramps are due to a deficiency in the adrenal gland (Richter, 1936); or may mean that an increase in salt-intake is necessary in pregnancy for the greater activity of the ovary (Thorn and Harrop, 1937).

(6) The cramps of pregnancy are apparently similar to the heat cramps in industry.

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Some Aspects of Foetal Pathology

(With Special Reference to the Role of Amniotic Bands)

BY

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"THERE is an impression very generally entertained in society, and especially among those whose experience or whose studies have made them but little conversant with the knowledge of disease, that

> . . . the thousand natural shocks
> That flesh is heir to . . .

is an inheritance on which we do not enter until we have breathed the breath of this world's life; and considering the peculiar circumstances of the child before birth, one would at first be inclined to conclude that although of course exposed to the risk of injury from accidents or disease occurring to the mother; it would not be liable to many or serious lesions of its own; yet observations and experience have fully and sadly revealed to us a very different state of facts, and force upon us the melancholy truth, that the seeds of life are often sown adultered with those of infirmity and decay; that disease may mutilate and death destroy long before our entrance into life: for, as far as past investigation has enabled us to reach, we have reason to believe that the unborn child is not only liable to certain affections peculiar to itself, but that it is also subject to almost all which affect the adult: and under this peculiar disadvantage, that, while for it there are indeed the *mille mortis viae*, there are not, unhappily, as yet added the *mille salutis*."

Montgomery (1863) wrote the above sentence. The profundity of the truth therein expressed is even more evident to-day.

Review of Literature.

Chaussier (1812) had been the first to draw attention to amniotic bands. He is quoted by Simonart (1845) and Montgomery (1863). The latter states:

"Chaussier, like most of his predecessors, attributes the accident of gangrene as the cause which would most obviously account for its production, though it does not appear from his account that there were present any of the pathological evidences of that condition; and, in the case first related, the child was born alive, and it is expressly mentioned that neither the stump of the limb nor the part amputated showed any symptom of disorganisation or disease, not being even discoloured."

Watkinson (1825) gives the first account in this country of a case of intrauterine amputation, but he does not record the presence or absence of bands. The left leg had been completely amputated a little above the ankle. The foot was found in the vagina in a state of good preservation ("nearly healed") after the premature birth of the child at seven months.

Montgomery ascribes the cause of amniotic bands to inflammatory changes. Quoting Dr. Simpson of Edinburgh (1836), Montgomery (1863) says:

". . . he also assents to, and indeed strongly confirms my view, both as to the agent which produced the change and its consisting of organised lymph, such as is usually elaborated under the influence of inflammatory action, from which it is well known that several varieties of foetal deformities arise, and it is a matter of every-day observation, how completely lymph so effused will

be converted into distinct firm threads, uniting opposite serous surfaces, especially those which move freely on each other as the pleurae and the peritoneal coverings of the abdominal viscera."

Indeed, Simpson (1856) had gone further and had published an essay to show that:

"There takes place on the stumps of the limbs that have seemingly undergone an early spontaneous amputation *in utero*, a rudimentary reproduction of the amputated parts, in consequence of which, on the end of many such stumps, there is observable a projecting mass or nodule, varying in size from a small cutaneous ridge to the bulk of a walnut, and having protruding from its surface, one, two, or more still smaller fleshy divisions or projections, which are provided at their extreme points with nails; which fact he justly regards as highly interesting from being, as he believes it to be, an effort or tendency in the human subject towards the reproduction of a lost extremity, which we so frequently see accomplished, and with a great degree of perfection in several of the lower classes of animals, and especially in the Crustacea."

Chiari (1911) called the amniotic bands "Simonart's bands", and he points out, "Braun (1854) had expressed the view for the first time that Simonart's bands were in reality abnormally disposed portions of the amnion itself." Chiari states:

"Microscopically, these bands consist of a wavy mass of amniotic connective tissue, exhibiting very few nuclei and no blood vessels; they are covered by amniotic epithelium which shades into the foetal epidermis."

No review of this subject would be complete without quotations from the observations of Ballantyne (1902):

"As a matter of fact, it cannot be said that any satisfactory explanation of the production of the so-called spontaneous amputations has yet been advanced. I believe that they are produced or initiated before the truly foetal period of antenatal life, and they are connected with maldevelopment of the amnion; further, I am hopeful that when new light is thrown upon the exact mode or origin of the amnion in the human subject, the whole question of the teratogenic effects of anomalies in its development will receive illumination. Till that times comes we must be content to speak somewhat vaguely of amniotic action, adhesions, bands, and the like. At the same time, congenital amputations must, I think, be regarded as teratological rather than traumatic in their origin, as belonging to the pathology of the embryo rather than to that of the foetus."

At a later date Ballantyne (1904) states:

"It is reasonable to expect that amniotic pressure without actual adhesions may in some instances be effective in teratogenesis. It is also quite conceivable that an adhesion may exist at an early period of development, and, having accomplished its pathological purpose, may then be absorbed or lost to view in the morbid process it has set up . . . The number of cases in which deformities of the extremities of almost all kinds have been ascribed to the action of the amnion is very large; but the instances in which bands or filaments or adhesions have been actually recognized are comparatively few."

Ballantyne, himself, had not met with an example of the variety of amniotic band "in which the adhesion is between some part of the foetus and the umbilical cord, or rather the covering of the cord."

The present day explanation of intrauterine amputation and annular constriction is that of Streeter (1930). He writes as follows:

"It may be stated that no evidence has been found that intrauterine amputation is due to amniotic bands or adhesions or other mechanical constriction. Amniotic bands do exist and are sometimes associated with malformations, but where this occurs the two participate in the same disturbance and the latter are not mechanically produced by the former. Structures that have frequently been mistaken for amniotic bands apparently fall into two categories: (*a*) macerated sheets of epidermis; (*b*) strands of hyalinized fibrous

tissue which are the residue of the localized areas of defective tissue and which are a part of our story . . . The writer finds that the preceding negative statement regarding the cause of intrauterine amputation can be framed more easily and more definitely than an affirmative one stating just why and how it occurs."

Streeter goes on to postulate

"a normal disparity in the quality and vitality of the different tissues of the body and that this disparity is inherent in the germ-plasm and hereditarily transmitted . . . By the time of birth the adjustment has for the most part been made and one finds traces of the damage in the form of depressions, grooves, or healed stumps, occasionally with slender residual strands of defective hyalinized material still adherent to the affected regions. It is these that have been mistaken for amniotic bands.

Stander (1945) supports Streeter's ideas. DeLee (1938) does not commit himself, beyond the statement that "the amnion offers promise of great results from scientific investigation." Munro Kerr (1937) is equally terse.

This subject has an interest for orthopaedic surgeons, and Bunnell (1944) writes:

"It is an old belief that some deformities are caused *in utero*. It was supposed that insufficient amniotic fluid resulted in compression, bending the extremities clubbed, and that constricting bands of amnion, adhesion or umbilical cord strangled limbs, resulting in the circular furrows found, and even in amputations. Bagg and others have shown definitely the fallacy of these theories. . . . Annular grooves and congenital amputations are not from intrauterine bands, but are merely ring-shaped defects."

I have consulted the work of Bagg (1924) and his observations were made after X-ray irradiation of animals *in utero*. He therefore produced experimental lesions in normal tissues, a state of affairs not comparable, or, at any rate, not directly applicable, to the present study.

Denis Browne (1936), in a discussion on "Congenital Deformities of Mechanical Origin", illustrates many cases of abnormal attitude of the foetus *in utero*, but he accepts the views of Streeter with regard to ring constrictions of the extremities. He illustrates also "the foot of a newborn baby showing marks suggesting pressure sores."

Mall (1917), on the other hand, studied localized anomalies in human embryos and infants at birth, and states:

"It is perfectly clear that monsters are not due to germinal and hereditary causes, but are produced from normal embryos by influences which are to be sought in their environment. . . . In any similar numbers of abortions localized anomalies should be noted twelve times as frequently as monsters at term."

Attention should be drawn to two interesting pre-war German papers, one by Gruber (1939) which has a most comprehensive bibliography, and another by Cohrs (1939). The latter stresses that the large variety of amniotic abnormalities as met with in man is quite unknown in domestic mammals and birds.

Very recent animal experiments by Warkany (1944) have proved that maternal dietary deficiencies can induce congenital malformations in the offspring, e.g., cleft palate, syndactylism of the fingers and toes, as well as other skeletal changes.

This review must mention the work of Gregg (1941), of New South Wales, who discovered the relationship between maternal rubella in pregnancy and certain congenital malformations, such as cataract, in the infant born subsequently. His original observations have been extensively corroborated and amplified by Swan, Tostevin and Black (1946).

Finally, Wiener (1946) has indicated the possibility of at least one variety of spina bifida being produced by Rh sensitization.

FIG. 1.

One end of amniotic band round annular constriction of leg as found at vulva.
(Case 1)

FIG. 2.

The raw annular constriction. (Case 1)

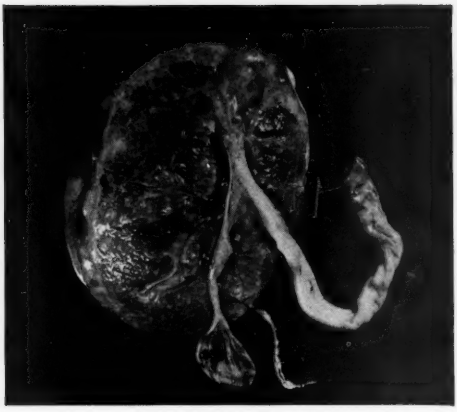


FIG. 3.

Foetal aspect of placenta, showing cyst of umbilical cord with other end of amniotic band. (Case 1)

FIG. 4.

The healed annular constriction. Bilateral varus deformity. (Case 1)

A B

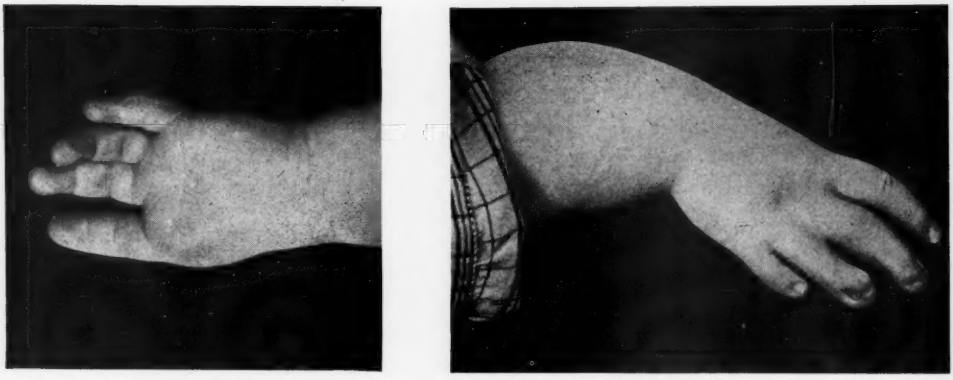
FIG. 5.

(A and B) Absence of digits.
B " Rudimentary reproduction of amputated parts " (Case 2).

FIG. 6.

Annular constriction above knee. (Case 2)

FIG. 7.
Raw area on medial aspect of each ankle. (Case 3)



A B

FIG. 8.
A. Left hand with no thumb.
B. Right hand with no thumb, abnormal nail beds, and absence of forearm bone (either radius or ulna—X-ray not conclusive) with flail elbow (Case 4).

G.L.

Personal Observations.

Case 1. Mrs. M. P., aged 24, 0-para, was admitted as an emergency on November 10th, 1946, because she had a "show" of blood following attempts at version by her doctor. She was then 37 weeks pregnant.

On examination, urine and blood pressure were normal. The woman looked well. She had no oedema. The baby was small and presented by the breech. There was a normal amount of liquor amnii. The foetal heart was strong and regular. Painful uterine contractions were occurring. No attempt at version was made until the patient was anaesthetised when it was considered version would be easy. But it proved otherwise. The head could be guided easily round to the iliac fossa, but the breech, which was above the brim, would not move in any direction. Indeed, the head escaped from the hand at this point and resorted to the fundus of the uterus. A second attempt was made but this time, as soon as the head was guided round to the iliac fossa, the membranes ruptured and the presentation remained a breech. The foetal heart was satisfactory.

Three hours later I was "scrubbed-up" waiting to aid delivery, if required, when I noticed what I thought was a ligature (similar to white-string cord-ligature) hanging from the ankle of one of the presenting limbs. Closer inspection revealed this ligature (Fig. 1) around an annular constriction (Fig. 2) of the baby's leg. This band was easily detached. The constriction of the leg had a raw, granulating surface. Delivery of a living male child, weighing 4 pounds 9 ounces, was completed spontaneously by the mother. The placenta was examined carefully and showed an umbilical cord cyst, and a piece of amniotic band similar to that round the ankle (Fig. 3). In my opinion this band, when intact, caused the immobility of the breech above the brim during attempts at version.

The constriction healed in a few days (Fig. 4). Plaster fixation treatment was instituted for the bilateral varus deformity (Fig. 4). The child also had a naevus on the back. There was no X-ray evidence of spina bifida.

When seen 6 months later the child was well, and its feet were in good position. (It was then still having plaster treatment). The constriction was causing no disability. The baby seemed normal mentally.

The mother stated that she had no illness during the first three months of pregnancy, but that she had infective jaundice just prior to and during the conception date. She had contracted the jaundice from her brother who was ill with it on his arrival home from Salonika a short time before.

The mother's blood was Group A, Rh negative, and the baby's, Group AB, Rh negative. Coombs' test was negative.

Case 2. A primigravida, aged 43, was admitted to hospital on September 11th, 1946, with a history of "heavy show." She was 38 weeks pregnant. She was not losing on admission. Blood pressure was 120/75, and the urine was clear. The head was above the brim in a right occipito-lateral position and the foetal heart was satisfactory. A few small fibroids could be palpated on the uterine wall near the fundus. The condition of the woman was excellent. She had no pain. Her blood group was A, Rh negative. No Rh antibodies had been detected on examination of the blood at the antenatal clinic on August 23rd.

X-ray pelvimetry the next day confirmed what had been found clinically, namely, contraction of the outlet. On September 14th a special type of X-ray was taken, from which the following report was made:

> "*Abdomen*: High head. Foetus displaced forwards. There is possibly a posterior placenta, but in which case it is probably only of the marginal variety. No foetal abnormalities seen."

On September 19th the patient had another "show" of blood, and lower segment Caesarean section was performed. A male child, weighing 6 pounds 6 ounces, was delivered alive with grossly deformed hands (Fig. 5, A and B), an annular constriction above the right knee (Fig. 6) and bilateral varus deformity of both feet.

The placenta proved to be most interesting. It was large and situated on the posterior wall of the uterus. The lower part was definitely praevia, thus accounting for the "warning" haemorrhages. When removal of the placenta was attempted after the routine intrauterine injection of ergometrine (0.5 mg.), the upper portion was seen to be separated by retro-placental clot, but the lower half was truly placenta accreta. No plane of cleavage could be found. In view of the gross deformities of the

child, and despite the Rhesus factor, it was decided to try to conserve the uterus, and the accreta portion of the placenta was removed piecemeal with great difficulty. Blood transfusion was started. The uterus was packed with gauze, using DeLee's shuttle. At the end of the operation, the vagina also was packed. Penicillin and sulphadrug therapy was instituted immediately. In 9 hours the vaginal pack was removed, and the uterine pack in 18 hours. There was no further haemorrhage and the patient's convalescence thereafter was smooth and without any notifiable pyrexia.

No amniotic bands were seen in this case. There was a normal amount of liquor amnii.

The patient has been seen 8 months later and her periods are painless, normal in amount, and regular. She has no complaints referable to her pelvic organs. She recalls that she was in bed for 5 days when just over 2 months pregnant with what her doctor called "food-poisoning", diarrhoea and vomiting.

The baby has completed plaster treatment for varus deformity. The result is good. Its blood is Group O, Rh positive. It appears normal mentally.

CASE 3. Mrs. M., aged 20, 0-para, had a normal spontaneous delivery at term in 1943. The baby was born with the lesions seen in Fig. 7, described as "injury on medial aspect of both ankles extending into deep tissues."

The pregnancy had been normal apart from slight rise in blood pressure and swelling of the ankles in the last 2 weeks. Both the mother's Wassermann reaction and the child's were negative. The Rh factor was not determined. The placenta was healthy and complete, as were the membranes. There had been no oligohydramnios.

For one week the lesions were treated with a bland ointment without improvement, then, after an initial débridement, the sites were enclosed in sterile Bunyan envelopes and irrigated with 2 per cent solution of sodium hypochlorite. In one week the left ankle had completely healed and granulation and epithelialization was well established on the right side. At this point the mother removed the child from hospital against medical advice.

CASE 4. Mrs. M., aged 34, had had one miscarriage at 2 months. On February, 21st 1944, labour was induced at 39 weeks for pre-eclamptic toxaemia. At birth, the child had the deformities seen in Fig. 8, A and B. (Photograph taken when child was 3 years old).

Mrs. M. can recall no illness during the first 3 months of that pregnancy. There is no evidence that there was hydramnios or oligohydramnios. The child at 3 years of age is a healthy boy of normal intellect, who is overcoming the limitations of his deformity in the most amazing manner.

The mother's blood group is A, Rh positive, and that of the child, O, Rh positive.

A second child was born in February, 1946, and it is normal in every way.

DISCUSSION.

It would be advisable to restate briefly the theories already reviewed as to the causation of amniotic bands, intrauterine amputations, and congenital abnormalities.

1. Gangrene of part (Chaussier).
2. Inflammatory (Montgomery, Simpson).
3. Abnormal disposition of portions of amnion (Braun, Chiari).
4. Maldevelopment of amnion ± pressure. ("Teratological rather than traumatic." "Embryo rather than foetus." [Ballantyne].)
5. A normal disparity in quality and vitality of different tissues, inherent in the germ-plasm and hereditarily transmitted (Streeter).
6. Merely ring-shaped defects (Bagg, Bunnell).
7. Environmental influences (Mall).
8. Dietetic (experimental) (Warkany).
9. Rubella (Gregg).
10. Incompatible Rh Groupings (Wiener).

One feels that Chaussier and his successors failed to distinguish between cause and effect. One argument against an inflammatory cause is that microscopic section of the band in Case 1 showed no inflammatory reaction, and was in accord

with the description given by Chiari, "amniotic connective tissues."

I have no doubt that Fig. 5 B illustrates the "rudimentary reproduction of the amputated parts" described by Simpson. In my opinion this is the effect produced by bands not in themselves of sufficient constricting power to amputate, whereas another band did in fact amputate at a more distal level.

Like Ballantyne, I believe that amniotic bands (not "adhesions") are the result of faults in the developing amnion. He, himself, had never seen a band as illustrated in Fig. 1. He does believe that such a band may exist at an early period of development and later become absorbed. It is an interesting conjecture whether the band found in Case 1 would have been absorbed when the pregnancy had reached term. Certainly, in Case 2 (Fig. 6) there was, at term, an annular constriction but no band. The vigorous intrauterine movements of the foetal limbs, particularly if enmeshed by amniotic bands, would favour rupture of the band and its subsequent absorption —witness the accident during version in Case 1.

Streeter, himself, admits that it is easier to offer destructive rather than constructive comment as to the cause and effect of amniotic bands. I feel that the findings in Case 1 are the direct answer to Streeter's doubts. In it there was both the annular constriction, and the band present and still attached, preventing external version.

It is impossible to give any satisfactory explanation for the skin deficiencies found in Case 3 (Fig. 7). The appearance is somewhat similar to Schlesinger's case, quoted by Denis Browne (1936), suggesting pressure sores.

Cases of congenital abnormality in which the maternal Rh factor had been tested were reviewed, and the findings are set out in Table I.

In 8 cases the maternal blood was Group A. The Rh factor was negative in 7 of the 10 cases. These numbers, of course, do not permit of conclusions being drawn, but I have considered them worth inserting in that they may be used for inclusion in any larger series by other workers, who may find a similar preponderance in the major blood-group factor.

Conclusions.

Like Montgomery, referred to in the introduction to this paper, I consider that "disease may mutilate" and calamity befall long before we enter postnatal life. I believe that the aetiology of foetal pathology, like adult pathology, may be grouped under the following headings: heredity, trauma, error of development, infection and new-growth.

Neoplastic change may affect an organ before birth, or the whole ovum may be affected in the early weeks, as in hydatidiform mole (? disordered hormonal stimulus). Infection of the mother by smallpox or syphilis may lead to similar infections of the foetus. An annular constriction of a limb or of the body (Professor Chassar Moir informs me that he has seen a woman with a deep, grooved constriction of the waist, "like a wasp") is an accident in that the limb is encompassed by an amniotic band (see Fig. 1) which, in itself, must be caused by incomplete blastocyte formation, a true error of development. The influence of heredity is sufficiently well-known to require no example.

In addition to these groupings, the developing structures of the foetus are peculiarly sensitive to sub-lethal noxious influences, for example, the cataract-producing effect of rubella. Later, the antibody effect of Rhesus factor incompatibility causes haemolytic disease of the new-born.

TABLE I.

	Parity	Deformity	Mother's blood	Baby's blood
1.	0	Syndactilism Bilateral varus (Case No. 2).	Group A Rh negative.	Group O Rh positive.
2.	One normal since.	Syndactilism Absence of one bone in forearm (Case No. 4).	Group A Rh positive.	Group O Rh positive.
3.	0	Amiotic band Bilateral varus (Case No. 1).	Group A Rh negative.	Group AB Rh negative (Coombs test negative).
4.	8	Recurrent mental deficiency.	Group O Rh negative.	——
5.	0	Meningocoele Spina Bifida.	Group A Rh negative.	Group O Rh negative (Coombs test negative).
6.	0	Cystic kidney disease and other abnormalities.	Group A Rh negative.	Group A Rh positive (Coombs test negative).
7.	0	Anencephaly.	Group A Rh negative.	——
8.	Four normal previously.	Hydrocephalus.	Group A Rh positive.	——
9.	Two normal previously.	Anencephaly.	Group A Rh positive.	——
10.	0	Anencephaly.	Group O Rh negative.	——

It has been shown experimentally that diet-deficiency will also cause foetal abnormalities.

On the clinical side, this subject is important in that antenatal supervision will have to begin earlier if the mysteries of foetal pathology are to be probed more fully. Further, the question of therapeutic abortion for possible foetal abnormality is raised by the known effects of rubella. Measures will be necessary to protect women against infection in early pregnancy. There is an immense field for exploration in the products of conception expelled at abortion.

Truly, "the first furrows are being ploughed in the wastes of foetal pathology" (Johnstone, 1947).

SUMMARY.

1. The literature of congenital malformations is reviewed, with special reference to the significance of amniotic bands.

2. Four cases are described, illustrating congenital abnormalities in living children. The presence of an amniotic band causing limb deformity has often been assumed but seldom seen: such a band is now recorded and illustrated.

3. In 8 of 10 cases of foetal abnormality the maternal blood was Group A. The Rh factor in the mother was negative in 7 of the 10 cases.

4. The classification of foetal pathology is discussed.

5. The clinical implications of the growing knowledge of foetal pathology are indicated.

I wish to record my thanks to Professor Chassar Moir, Dr. Robb-Smith, and my wife, for their kindly help.

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Inevitable, Incomplete and Septic Abortion

BY

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I AM writing this article to express my approval of the treatment of cases of incomplete abortion recently advocated by Corston and Stallworthy (1947); to support their dicta by an account of my own experience; and to make some criticisms. The treatment advocated is far from new. It has been the recognized method at the Rotunda Hospital to my personal knowledge for the past 50 years and it is the treatment described in every book written by a Master or Assistant of the Rotunda during this century.

During my 7 years of Mastership (1919–1926), 1,347 cases of abortion and early miscarriage were treated in the patients' homes; 502 cases were admitted and treated in the maternity wards; and during 5 years (figures for 2 are not available), 103 cases were treated in the gynaecological wards. These figures include only cases that ended with evacuation of the uterus and termination of the pregnancy, and all primarily applied or were admitted to the Hospital because of the active condition of some type of abortion. The cases treated in the maternity wards include a small number of miscarriages, chiefly early, that is, pregnancies with a history of 12 to 20 weeks' duration, in which the foetus had died but attained a size to be born first and followed by a placental third stage.

In the teaching of the Rotunda emphasis has always been laid on the importance of distinguishing between the abortion which comes away in a mass or in fragments and the miscarriage which has the definite 3 stages of labour and in which the third stage calls for management much as it does in labour at term. Cases with a development of pregnancy of from 18 to 24 weeks with the foetus born, the placenta retained, the patient bleeding, probably present as difficult a problem and as alarming an appearance when first seen as can be expected, and they offer little excuse for procrastination and postponement of active intervention, but such cases in the Rotunda district after they have been dealt with by hopeful but futile conservatism fall to the lot of the junior member of the staff "the Extern Assistant."

The relative number of the various types of case included in the above figures may be best estimated from the following statements in 2 early clinical reports. The nature of the cases applying to the Rotunda have not altered in any way since. "There were 64 cases of abortion treated in the hospital during the year and in no case was there any serious rise of temperature or other complication. In 9 cases the abortion was complete and needed no treatment. Severe haemorrhage occurred in only 5 cases. In the management of those cases which required treatment the flushing curette was generally used." "The cases of abortion and miscarriage were 64 in number, in 2 instances there was an insignificant rise of temperature, in 18 no treatment was needed, in 8 the bleeding

was severe." These figures suggest a very similar type of case to that dealt with by Stallworthy, who, of 600 cases, states "42 were frankly septic," whereas in the reports quoted above what is referred to as a serious rise of temperature is illustrated by the following: "One of these had a temperature rising on the fifth evening to 104.8°F." "One was admitted with a temperature of 101°F." "One had a roll of bandage in the vagina with a quantity of blood clot and a temperature of 102°F." "These 3 were the only cases of high temperature occurring." Again the conditions with regard to haemorrhage were probably also very similar. One of the above cases had been bleeding for 3 weeks, another had repeated haemorrhages for some weeks.

The line of treatment adopted in the Rotunda Hospital is well exemplified by the following quotations: "Some did not require any special treatment, only those in which the haemorrhage was severe, or in which any part of the ovum was still retained were interfered with. In all these cases the treatment adopted was the emptying of the uterus; if possible by expression of the contents. This failing, and the os being sufficiently dilated, the ovum was removed by the finger, or if the latter condition was not fulfilled, by Rheinstadter's Curette. In 1 case the cervix was cicatricial, it was dilated with Hegar's dilators and a 4 months' foetus extracted by means of Schultze's spoon-forceps. The patient's temperature rose on the evening of the 6th day to 104.6°F. and after a uterine douche fell to normal and remained so." "Another patient was admitted in the 4th month of pregnancy with a foetid discharge. The foetus could be felt in the dilated cervical canal. The external os was only the size of a threepenny-piece, it was divided bilaterally and the foetus extracted by Schultze's spoon-forceps. Free haemorrhage followed, the uterus was curetted and plugged with iodoform gauze. Convalescence normal."

In addition to the cases during my Mastership there were 777 cases treated in their homes, and 164 in the maternity wards during the 3 years that I was Assistant Master (1902–1905), making a total of 2,993; besides these there are the cases with which I have had to deal in private practice which have all been managed on the same lines as those in the Rotunda Hospital. All the cases referred to in the Rotunda were long before the advent of sulphonamides or blood transfusions, as were the great majority of my private cases. I have had no deaths in private practice and there were none in the early series (1902–1905) which were before even the adoption of intravenous saline, when reliance was placed on replacing fluid subcutaneously. There were 6 deaths; the following are the individual details.

CASE 1. Four months pregnant; bleeding for a week; refused to send to hospital. When first seen foetus born; patient bleeding severely. The placenta was retained but easily removed. The woman failed to respond to restoratives.

CASE 2. Three-and-a-half months pregnant; foetus born; placenta retained 3 days, easily removed. Temperature and pulse raised. Died on 26th day. Autopsy showed abscess of lung due to haemolytic streptococcal infection.

CASE 3. Admitted as incomplete septic abortion, uterus emptied with finger, uterine douche given. Signs of peritonitis developed. Vaginal hysterectomy done on 2nd day. Died on 3rd day.

CASE 4. Admitted as incomplete abortion, bleeding for a week; temperature raised. Uterus emptied with finger and douche given. Low morbidity, marked debility and anaemia. Went home against

advice 12th day, temperature 100°F. Died suddenly 2 days later.

CASES 5 and 6. Both miscarriages at 24th week; admitted with retained placentae. One died while being anaesthetized prior to manual removal. The other had rigors and temperature 103°-105°F. from first day and died on 11th day.

In my *Practical Midwifery* (1923) I say under "Threatened Abortion": "If any cause for the condition can be found it must be corrected at once if possible. Thus a retroverted uterus is replaced and supported by a pessary. It may not prevent the abortion. When the bleeding persists all discharge should be inspected for fragments of the ovum which would indicate the change to incomplete abortion. When the bleeding is moderately severe and persistent it may be an indication for emptying of the uterus and will nearly always be associated with a dead ovum. The bleeding is very seldom of sufficient severity to call for interference in the presence of a living ovum unless there is active uterine action which will undoubtedly terminate the pregnancy." Under "Incomplete Abortion" I say, "when a case is diagnosed as an Incomplete Abortion, either when first seen or after treatment as a threatened abortion, it is better to complete the emptying of the uterus at once." Under "Septic Abortion" I say, "there is only one rational treatment, and that is to clear out the cavity." I repeat these remarks in my *Obstetrics* (1937) but modify the first and say "the bleeding is never so severe as to require emptying of the uterus if the ovum is alive." This line of conduct implies the necessity of making a vaginal examination in the first instance: First, to establish the fact of pregnancy and to estimate its duration, which may not correspond to the history. Second, to define the condition and position of the uterus. Third, to ascertain the degree of dilatation of the cervix and the extent to which the uterus has evacuated its contents. Then if the condition is considered inevitable or incomplete, whether it is suspected of being septic or not, the uterus is evacuated in the patient's own home without delay or she is moved into hospital for evacuation. Stallworthy says "failure to make this preliminary examination can result in the soft wall of a pregnant retroverted uterus being perforated." How anyone could contemplate passing any instrument without first defining the position of the uterus is difficult to conceive, while the omission of this examination prevents a differential diagnosis. Further, he says, in connexion with septic cases: "If haemorrhage was severe the patient was taken to the theatre without further delay: if it was not severe operation was postponed for 12 to 24 hours to obtain concentration of sulphonamides." Such a line of treatment is inconsistent with the theme of his paper, nor are there any definite signs indicated by which the fact of sepsis being present is established. It would not be reasonable to claim that all cases with fever are septic and recover only by virtue of the sulphonamides, nor could such be held in face of the cases I have cited. In private practice I have followed the same line of treatment; either evacuating the uterus in the patient's own home without delay if the condition found on examination indicated that such treatment could be effected easily, or I have moved the patient into a nursing home, usually in my own car, and evacuated the uterus without delay. If the patient has bled severely or was continuing to bleed severely I have not infrequently given an anaesthetic (chloroform) myself rather than delay when I have had difficulty in finding an anaesthetist.

I have never regretted immediate action as an alternative to permitting further loss of blood. In such a case the cervix will

usually admit the finger but if not is always easily dilated to 14 to 16 mm., which will admit a finger, while less will admit the only form of curette that should be used, a Rheinstadter's blunt flushing curette or spoon, carrying a free flow of fluid with a pressure not greater than that produced by a 12-inch head. A Rheinstadter's curette has no cutting properties, it scrapes the surface and hooks and flushes loose material out of a cavity. The majority of patients, when the uterus has been emptied and rubbed up bimanually, cease to bleed, just as after manual removal of the placenta, and the uterus does not require to be plugged. In my books I say plugging should be removed within 6 hours and septic abortions should not be plugged. The patient is better for being allowed out of bed for all necessities afterwards, allowed to sit up next day and go home on the third or fourth day. Iron and ammonium citrate, gr. iii thrice daily, will restore the blood loss in the next few weeks as rapidly as can be and is the maximum dose of iron that can be absorbed; it is better continued for a couple of months and in such doses will not cause gastric disturbance.

Stallworthy refers to venous spasm as evidence of extreme blood-loss or shock. In my opinion such spasm is evidence of full compensation for the loss incurred and maintenance of same by vasoconstriction and therefore there is no anaemia of the brain centres. The essential in treatment is to stop further loss and if this is effected before the vasomotor centre suffers from anoxaemia balance will be fully maintained. On the other hand if delay allows anaemia of the centre to develop vasoconstriction will fail and the resulting fall in pressure, although it will probably stop the bleeding, leaves the patient in a precarious state from failure of the autonomic system. Blood transfusion may maintain a balance, it may also restart the bleeding and the blood be lost as rapidly as it is introduced; little is gained until the bleeding is stopped. In the same way oxytocic drugs produce a forced activity of the vasomotor centre but their local action is by contracting the bleeding site and this is ineffective if the site is not clean or the cavity is not empty; therefore when their action passes off the subsequent collapse is the greater. The one essential is to stop the bleeding before the vital centres are affected and then they will maintain full compensation. In the *British Medical Journal* (2.8.47), in the answer under the heading "Removal of Placenta", the advisability of giving ergometrine is queried and it is stated: "Usually it produces immediate separation of the placenta which can then be expressed. If, however, the placenta does not come away at once manual removal has to be carried out without delay." Obviously the reason for this is that the drug has promoted bleeding by separating the placenta, and delay risks the imprisonment of the placenta by hour-glass contraction, while the drug does not control the loss. The same applies to the action of this drug in the treatment of abortion, except that the forced uterine action may complete the emptying of the cavity and so the bleeding will cease. This paper is largely composed of quotations but I will close with one more from Purefoy's Clinical Report for the year 1902-1903. "It is not a little surprising how uncertain and timid most modern obstetric writers are in giving instructions as to the treatment of inevitable abortion and miscarriage. Masterly inactivity on the part of the physician cannot be too strongly condemned in these cases."

The Incubation Period of Ophthalmia Neonatorum

BY

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EVEN in the pioneer days of Neisser and Crede in the two penultimate decades of the last century, there was considerable doubt whether the gonococcus was the only causal agent of ophthalmia neonatorum. By the beginning of this century it was clearly recognized that ophthalmia neonatorum is caused by a variety of organisms, whilst the classical work of Halberstaedter and Prowazek in 1907, and of Stargardt in 1909, indicated the possibility of an ultramicroscopic virus as yet another causal agent. It would appear that the gonococcus was indeed the dominant causal organism towards the end of the last century and the beginning of this (Stephenson, 1907), but that the incidence of gonococcal ophthalmia neonatorum has declined considerably during the past 50 years or so. To-day the gonococcus is no longer the dominant causal agent; it accounted for no more than 180 of a consecutive series of 737 cases recorded elsewhere (Sorsby, 1945). *Staphylococcus aureus* would appear to be a more common exciting factor, and it is likely that, the virus of inclusion blennorrhoea is as common.

The change in the relative significance of the different causal agents of ophthalmia neonatorum raises the question whether the accepted teaching that ophthalmia neonatorum generally develops within the first 5 days after birth—a view elaborated when the gonococcus was the dominant causal agent—is still valid. To assess this validity, a consecutive series of 312 cases of ophthalmia neonatorum seen at the Ophthalmia Neonatorum Unit at White Oak Hospital during part of 1944, the whole of 1945 and 1946, and the early months of 1947, was studied. Information was sought as to the day of onset of the infection in the infants admitted, and this was correlated with the bacteriological and cytological examinations carried out. In 7 cases the records were incomplete in one or other respect, and there were 15 cases previously treated unsuccessfully elsewhere. These were eliminated from consideration so that the total was reduced to 290 cases. There were also excluded 5 cases occurring after 21 days (1 case each on the 22nd, 23rd, 26th, 35th, and 44th days).

FINDINGS.

Day of Onset in the series as a Whole.

Table I sets out the findings in these 290 cases. It will be seen that these cases fall into 4 distinct groups. In 179 cases organisms only were found; in 67 cases both inclusion bodies and organisms were found; in 15 cases neither organisms nor inclusion bodies were observed, and in 29 cases there were inclusion bodies only. In no cases was ophthalmia observed on the day of birth, whilst each of the days from the 1st to the 14th inclusive contributed a substantial quota with occasional cases occurring on the 16th, 18th and 21st day.

Fig. 1 shows the percentage-frequency on each day from the 1st to the 21st. Taking the series as a whole, it can be seen that 119 cases (41.03 per cent) occurred on the 1st to the 5th day, and 126 (43.45 per cent)

TABLE I

Day of Onset after Birth in Relation to Causal Organis

Day of onset		Staphylococcus aureus	Staphylococcus albus	Diphtheroids	Gonococcus	Pneumococcus	Koch-Weeks bacillus	Streptococcus viridans	B. friedländer	Haem. streptococcus	Non-haem. streptococcus	Morax Axenfeld bacillus	Sub
		Cases showing organisms only											
1st	Mild	1	–	1	–	–	–	–	–	–	–	–	2
	Moderate	– } 1	–	3 } 4	3 } 4	–	–	–	–	–	–	–	6
	Severe	–	–	–	1	–	–	–	–	–	–	–	1
2nd	Mild	3	–	–	1	1	–	–	–	1	–	–	6
	Moderate	– } 3	2 } 2	1 } 2	3 } 8	– } 1	– } 1	– } 1	–	– } 1	–	–	6
	Severe	–	–	1	4	–	1	1	–	–	–	–	7
3rd	Mild	3	3	–	1	–	–	–	–	–	–	2	7
	Moderate	2 } 6	1 } 4	3 } 5	3 } 10	1 } 1	–	–	–	–	–	2 } 2	12
	Severe	1	–	2	6	–	–	–	–	–	–	–	9
4th	Mild	1	1	–	–	–	–	–	–	–	–	–	2
	Moderate	1 } 3	1 } 2	2 } 5	1 } 2	1 } 2	–	1 } 1	–	–	–	–	7
	Severe	1	–	3	1	1	–	–	–	–	–	–	6
5th	Mild	2	1	2	–	–	–	–	–	–	–	–	5
	Moderate	4 } 6	1 } 2	1 } 6	2 } 2	–	–	–	2 } 2	–	1 } 1	–	9
	Severe	–	–	3	2	–	–	–	–	–	–	–	8
6th	Mild	2	–	1	–	–	–	–	–	–	–	–	3
	Moderate	2 } 4	– } –	2 } 3	1 } 2	– } –	–	2 } 2	–	–	–	–	7
	Severe	–	–	–	1	–	–	–	–	–	–	–	1
7th	Mild	2	3	3	–	1	–	–	–	1	–	–	10
	Moderate	5 } 9	1 } 5	4 } 8	3 } 4	1 } 2	–	–	–	– } 1	–	–	14
	Severe	2	1	1	1	–	–	–	–	–	–	–	5
8th	Mild	1	–	1	–	–	–	–	–	–	–	–	2
	Moderate	2 } 3	– } –	4 } 6	1 } 1	– } –	–	1 } 1	–	–	–	–	8
	Severe	–	–	1	–	–	–	–	–	–	–	–	1
9th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	– } 1	2 } 3	1 } 1	1 } 2	– } –	–	–	–	–	–	–	4
	Severe	1	1	–	1	–	–	–	–	–	–	–	3
10th	Mild	2	2	1	–	–	–	–	–	–	–	–	5
	Moderate	1 } 3	3 } 6	– } 1	– } –	– } –	1 } 1	–	–	–	–	–	5
	Severe	–	1	–	–	–	–	–	–	–	–	–	1
11th	Mild	3	–	–	–	–	–	–	–	–	–	–	3
	Moderate	2 } 5	– } –	– } 1	– } –	– } –	– } –	– } –	–	–	–	–	2
	Severe	–	–	1	–	–	–	–	–	–	–	–	1
12th	Mild	2	1	1	–	–	–	–	–	–	–	–	4
	Moderate	1 } 3	– } 1	1 } 2	– } –	– } –	– } –	– } –	–	–	–	–	1
	Severe	–	–	1	–	–	–	–	–	–	–	–	1
13th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	1 } 1	– } –	– } –	– } –	– } –	– } –	– } –	–	–	–	–	1
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
14th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	1 } 2	– } –	– } –	1 } 1	– } –	– } –	– } –	–	–	–	–	2
	Severe	1	–	–	–	–	–	–	–	–	–	–	1
15th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	– } –	– } –	– } –	– } –	– } –	– } –	– } –	–	–	–	–	–
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
16th	Mild	–	–	–	–	–	1	–	–	–	–	–	1
	Moderate	– } –	– } –	1 } 1	– } –	– } –	– } 1	– } –	–	–	–	–	1
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
17th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	– } –	– } –	– } –	– } –	– } –	– } –	– } –	–	–	–	–	–
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
18th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	– } –	– } –	– } –	– } –	– } –	– } –	– } –	–	–	–	–	–
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
19th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	– } –	– } –	– } –	– } –	– } –	– } –	– } –	–	–	–	–	–
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
20th	Mild	–	–	–	–	–	–	–	–	–	–	–	–
	Moderate	– } –	– } –	– } –	– } –	– } –	– } –	– } –	–	–	–	–	–
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
21st	Mild	–	–	–	–	–	1	–	–	–	–	–	1
	Moderate	1 } 1	– } –	– } –	– } –	– } –	– } 1	– } –	–	–	–	–	1
	Severe	–	–	–	–	–	–	–	–	–	–	–	–
Total	Mild	22	11	10	2	2	2	–	–	2	–	1	51
	Moderate	23 } 51	11 } 25	22 } 45	17 } 36	3 } 6	3 } 6	2 } 3	2 } 2	– } 2	1 } 1	2 } 2	86
	Severe	6	3	13	17	–	1	1	–	–	–	–	42

TABLE I

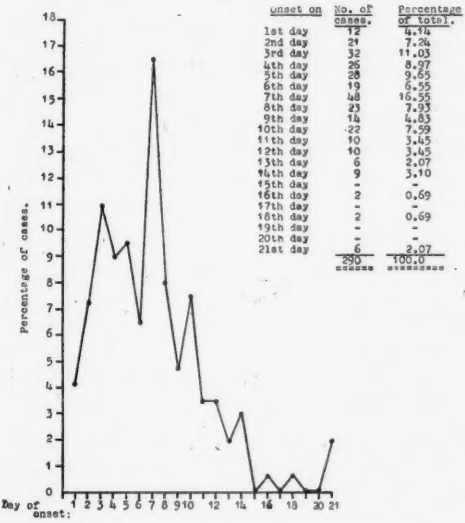
Organisms (or presence of inclusion bodies) and Severity

	Cases showing inclusion bodies and organisms												
...rax ...nfeld ...illus	Sub-total	Staphylo-coccus aureus	Staphylo-coccus albus	Diph-theroids	Gono-coccus	Pneumo-coccus	Strepto-coccus viridans	B. fried-länder	Sub-total	Cases with neither org. nor inclusion bodies	Cases with inclusion bodies only	Total
	2 6 1 } 9	-	1 } 1	-	-	-	1 } 1	-	1 1 } 2	-	1 } 1	2 8 2 } 12
	6 6 7 } 19	1 } 1	1 } 1	-	-	-	-	-	1 1 } 2	-	-	7 7 7 } 21
2	7 12 9 } 28	1 } 1	-	-	-	-	-	-	1 } 1	1 } 1	1 1 } 2	9 14 9 } 32
	2 7 6 } 15	1 1 1 } 3	1 5 } 6	-	-	-	-	-	2 6 1 } 9	2 - } 2	-	4 15 7 } 26
	5 9 5 } 19	- 2 - } 2	1 1 } 2	2 1 } 3	-	-	-	-	5 2 } 7	1 } 1	1 - } 1	6 15 7 } 28
	3 7 1 } 11	- 2 - } 2	1 - } 1	2 - } 2	-	-	-	-	1 4 - } 5	- 1 } 1	1 1 - } 2	5 12 2 } 19
	10 14 5 } 29	- 1 } 1	- 4 } 4	3 4 - } 7	-	-	1 - } 1	-	4 8 1 } 13	- 2 - } 2	1 1 2 } 4	15 25 8 } 48
	2 8 1 } 11	-	- 2 2 } 4	1 1 } 2	-	-	-	-	- 3 4 } 7	1 } 1	- 3 1 } 4	3 14 6 } 23
	- 4 3 } 7	-	1 - } 1	1 1 } 2	-	-	-	1 - } 1	3 1 - } 4	1 } 1	- 1 1 } 2	4 6 4 } 14
	5 5 1 } 11	- 1 } 1	- 1 } 1	1 2 } 3	-	-	-	-	1 4 - } 5	1 1 } 2	1 3 } 4	8 13 1 } 22
	3 2 1 } 6	- 1 } 1	1 1 } 2	-	-	-	-	-	1 1 1 } 3	-	- 1 } 1	4 4 2 } 10
	4 1 1 } 6	-	-	-	-	-	-	-	-	- 1 } 1	1 2 } 3	5 3 2 } 10
	- 1 } 1	-	- 1 } 1	-	- 1 } 1	-	-	-	- 1 1 } 2	1 - } 1	2 - } 2	3 2 1 } 6
	- 2 1 } 3	-	1 1 } 2	- 1 } 1	-	1 } 1	-	-	1 3 } 4	1 - } 1	- 1 } 1	2 5 2 } 9
	-	-	-	-	-	-	-	-	-	-	-	-
	1 1 } 2	-	-	-	-	-	-	-	-	-	-	1 1 } 2
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	- 1 } 1	-	-	-	-	-	- 1 } 1	-	- 1 } 1	1 1 } 2
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
	1 1 } 2	-	1 - } 1	- 1 } 1	-	-	-	-	1 1 } 2	- 1 } 1	- 1 } 1	2 4 - } 6
- 2 } 2	51 86 42 } 179	1 8 3 } 12	7 18 3 } 28	5 14 2 } 21	- 1 } 1	- 1 } 1	1 - 2 } 3	1 - } 1	15 41 11 } 67	6 7 2 } 15	9 15 5 } 29	81 149 60 } 290

on the 6th to the 10th day; 35 cases (12.1 per cent) were observed on the 11th to the 15th day, and 10 (3.4 per cent) on the 16th day to the 21st. There is, therefore, concentrated in the first 10 days no less than 84.5 per cent of the total of cases, and there is little difference between the first 5 days of life and the subsequent 5 days. Assessed against individual days, the maximum incidence occurred on the 7th day (16.5 per cent) whilst the 3rd and 5th day contributed 11.0, 8.9, and 9.6 per cent of cases respectively. The 10th day still contributed 7.6 per cent of cases, with a rapid falling-off on the subsequent days.

FIG. 1.

Frequency of onset on the different days after birth in the series as a whole.



Onset on	No. of cases.	Percentage of total.
1st day	12	4.14
2nd day	21	7.24
3rd day	32	11.03
4th day	26	8.97
5th day	28	9.65
6th day	19	6.55
7th day	48	16.55
8th day	23	7.93
9th day	14	4.83
10th day	22	7.59
11th day	10	3.45
12th day	10	3.45
13th day	6	2.07
14th day	9	3.10
15th day	-	-
16th day	2	0.69
17th day	-	-
18th day	2	0.69
19th day	-	-
20th day	-	-
21st day	6	2.07
	290	100.0

Day of Onset in the 4 Main Groups.

As can be seen from Table II the day of onset in the group in which organisms only were observed differed from the series as a whole. In the 179 cases with organisms only 50.3 per cent occurred between the 1st to the 5th day, and 38.5 per cent from the 6th to the 10th day. In contrast, the corresponding percentages from the 67 cases showing both organisms and inclusion bodies were 31.3 and 50.7—a definite shift towards the 6th to 10 day. In the 29 cases with inclusion bodies only, this shift becomes still more marked, whilst substantially the same relationship is seen when the series of 29 cases is combined with a further group of 25 cases recorded previously. (Sorsby, Hoffa, and Young, 1944); only 16.7 per cent of cases occurred in the first 5 days of life and 55.5 per cent were concentrated in the 6th to the 10th day.

The group of 15 cases in which neither organisms nor inclusion bodies were found

TABLE II.

Showing Days of Onset in the Series as a Whole and in the 4 Main Groups.

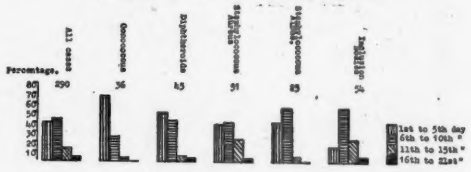
Onset on day of life	All cases		Organisms only		Organisms and inclusion bodies		Neither organisms nor inclusion bodies		Inclusion bodies only		Inclusion bodies only, incorporating 25 cases recorded previously	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	per cent
1st to 5th	119	41.03	90	50.28	21	31.34	4	26.67	4	13.79	9	16.67
6th to 10th	126	43.45	69	38.55	34	50.75	7	46.67	16	55.17	30	55.55
11th to 15th	35	12.07	16	8.94	9	13.43	3	20.00	7	24.14	12	22.22
16th to 21st	10	3.45	4	2.23	3	4.48	1	6.66	2	6.90	3	5.56
		100.0		100.0		100.0		100.0		100.0		100.0
	290	(100.0)	179	(61.73)	67	(23.10)	15	(5.17)	29	(10.00)	54	

is too small to lend itself to statistical assessment. If the day of onset is to be regarded as the last day of the incubation period, there is, therefore, a sharp difference in incubation period in the cases with organisms as contrasted to those in which inclusion bodies are present. The intermediate percentage obtained for the group with both organisms and inclusion bodies suggests that in most of these cases the organisms found are indeed the causal factors, although in a minority they are probably non-pathogenic so that the ophthalmia observed in these infants is in fact a virus blennorrhoea.

Day of Onset in Relation to the Commoner Causal Organisms.

Confining attention to the 179 cases in which organisms only were found, it will be seen that the pneumococcus, Koch-Weeks bacillus, *Streptococcus viridans, Bacillus friedländer,* haemolytic streptococcus, non-haemolytic streptococcus, and the Morax-Axenfeld bacillus are only occasional causal factors; together they account for only 22 cases. The remaining 157 cases include 51 of *Staphylococcus aureus,* 45 of diphtheroids, 36 gonococcus and 25 *Staphylococcus albus.* As can be seen from Table III and Fig. 2 the day of onset for these 4 organisms differs considerably. With the gonococcus 26 out of 36 cases (72.2 per cent) occurred within the 1st to 5th day and only 9 cases (25 per cent) during the period 6th to 10th day. In contrast there was an almost even distribution for each of these 2 periods in cases with *S. aureus,* 19 cases (37.2 per cent) and 20 cases (39.2 per cent) respectively. The distribution for diphtheroids was intermediate between that observed for the gonococcus and the *S. aureus* (48.9 per cent during the first 5 days and 42.2 per cent during the second 5 days of life). Cases with *S. albus* showed a rather greater incidence in the second 5 days than in the first (56 per cent and 40 per cent respectively).

FIG. 2.
Distribution as to day of onset in relation to the commoner causal organisms.



Day of Onset in Relation to Severity of Affection.

It will be seen from Table IV and Fig. 3 that out of the total of 290 cases, 149 (51.4 per cent) were of moderate severity; there were rather more mild cases than severe ones, the respective percentages being 27.9 and 20.7. Contrasting the cases with onset from 1st to 5th day with those with the onset in the 6th to 10th day the distribution of mild, moderate and severe reactions is somewhat different; there are fewer severe cases in the second time-period, 21 out of

TABLE III.
Showing Days of Onset in Relation to Each of the Commoner causal Organisms.

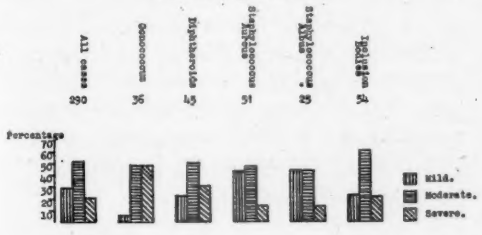
Organism	Total	1 to 5 days		6 to 10 days		11 to 15 days		16 to 21 days	
		No.	per cent	No.	per cent	No.	per cent	No.	per cent
Gonococcus	36	26	72.22	9	25.00	1	2.78	—	—
Diphtheroids	45	22	48.89	19	42.22	3	6.67	1	2.22
Staphylococcus aureus	51	19	37.25	20	39.22	11	21.57	1	1.96
Staphylococcus albus	25	10	40.00	14	56.00	1	4.00	—	—

TABLE IV.
Showing Severity of Affection in Relation to day of Onset.

Onset on day of life	All cases		Mild		Moderate		Severe	
	No.	per cent	No.	per cent	No.	per cent	No.	per cent
1st to 5th	119	100.0	28	23.53	59	49.58	32	26.89
6th to 10th	126	100.0	35	27.78	70	55.55	21	16.67
11th to 15th	35	100.0	14	40.00	14	40.00	7	20.00
16th to 21st	10	100.0	4	40.00	6	60.00	—	—
Total	290	100.0	81	27.93	149	51.38	60	20.69

126 (16.7 per cent) against 32 out of 119 (26.9 per cent) in the 1st to 5th days. This difference is, however, not significant statistically, so that it may be assumed that there is nothing to suggest that ophthalmia neonatorum developing from the 6th to the 10th day is likely to be less severe than instances of the affection developing earlier. Taking Table IV as a whole it would however, appear that there is a slight shift of the more severe cases towards the first 5 days of life.

FIG. 3.
Severity of affection in relation to the commoner causal organisms.



Severity in Relation to Causal Organisms

Summary Table V and Fig. 3 show that the highest proportion of severe cases occurs when the infecting organism is the gonococcus: 17 in a series of 36 (47.2 per cent). A distinctly smaller proportion of severe cases is seen with the diphtheroids: 13 out of 45 (28.9 per cent). *S. aureus* gives a low incidence of severe cases, 6 out of 51 (11.8 per cent); and a similar low incidence is observed with *S. albus*, 3 out of 25 (12 per cent). Ophthalmia neonatorum with inclusion bodies appears to lie intermediate between the gonococcus and diphtheroids on the one hand and staphylococci on the other: there were 10 severe cases in a series of 54 (18.5 per cent). Mild cases appear to be exceptional with the gonococcus.

DISCUSSION.

Validity of the material.

The material recorded here may be taken as representative. Not all babies with ophthalmia neonatorum in London are

TABLE V.
Showing Severity of Affection in Relation to Each of the Common Causal Organisms.

Organism	Total	Mild		Moderate		Severe	
		No.	per cent	No.	per cent	No.	per cent
Gonococcus	36	2	5.56	17	47.22	17	47.22
Diphtheroids	45	10	22.22	22	48.89	13	28.89
Staphylococcus aureus	51	22	43.14	23	45.10	6	11.76
Staphylococcus albus	25	11	44.00	11	44.00	3	12.00
Virus, presumed from presence of inclusion bodies	54*	12	22.22	32	59.26	10	18.52

* Including 25 cases recorded previously.

admitted to White Oak Hospital; many receive treatment in obstetric units. There is, however, no special selection as regards admission. To eliminate the possibility of the series being loaded with resistant cases admitted for in-patient treatment, the 15 cases which were treated prior to admission to White Oak Hospital were excluded.

Validity of Bacteriological and Cytological Findings.

It is generally assumed that diphtheroids and *S. albus* are contaminants rather than exciting organisms. This is probably true of *S. albus*, particularly when the organism is coagulase-negative. As for diphtheroids, the fact that cases thus infected are somewhat resistant to penicillin therapy (Sorsby, 1947) strongly suggests that these organisms are of positive significance. Whilst the data on cases with *S. albus* have to be treated with some reserve, it may be taken that those for other organisms are valid.

Incubation Period in Ophthalmia Neonatorum at present.

The evidence submitted shows that the incubation period for ophthalmia neonatorum must be regarded as extending up to the 10th day. The cases seen after the 10th day—and these fall off rapidly—are probably examples of secondary infection. "Late" cases were well known and somewhat puzzling to the older observers (Stephenson, 1907) who were right in stressing the secondary character of some of these infections, but wrong in assuming that all cases after the 4th to 5th day were accidental infections. The occurrence of a considerable number of cases due to diphtheroids, *S. aureus* and the virus of inclusion blennorrhoea, with their large quota of infection setting in on the 6th to 10th day, as also the fact that some 20 to 25 per cent of all cases of inclusion blennorrhoea occur on the 11th to 15th day shows that cases of ophthalmia neonatorum due to organisms other than the gonococcus tend to develop late. It is of interest to note that in the present series the gonococcal cases occurred predominantly in the first 5 days of life.

Degree of Severity in Ophthalmia neonatorum at Present.

Most cases seen are of moderate severity, but the highest proportion of severe cases occurs with the gonococcus. With this organism mild cases are unusual, and the incidence of severe cases equals that of moderate cases. With the other exciting organisms moderate cases predominate though diphtheroids and inclusion bodies give a substantial quota of severe cases. A severe case observed during the first 5 days of life has, therefore, a great probability of being due to gonococcus. Severe cases seen in the second 5 days of life are more likely to be due to diphtheroids or the virus of inclusion blennorrhoea.

Late Cases.

Of the 290 cases, 45 (15.5 per cent) occurred after the 10th day, mostly between the 11th and 15th day, 35 cases (12.1 per cent). It is likely that some of these cases are the result of extragenital infection, rather than cases of ophthalmia neonatorum in the strict sense. The marked fall in the number of cases with onset after the 10th day would suggest that the 10th day may be regarded as the upper limit of the incubation period, but the presence of inclusion bodies in no less than 21 out of the 45 cases with late onset, would seem to indicate that some of the late cases are indeed genital infections caused by the virus of inclusion blennorrhoea. On the other hand the occurrence of secondary

infection cannot be doubted. This was well shown in 2 cases in the present series. Two infants with unilateral infection due respectively to the gonococcus and diphtheroids responded satisfactorily to penicillin administered systemically. However, the second eye became involved on the 2nd and 3rd day after cessation of treatment, and the respective organisms were recovered from the eyes affected. Both these infants had been nursed by their mothers. Some of the "relapses" seen after treatment are probably also examples of a secondary, extragenital infection.

Summary.

A consecutive series of 290 cases of ophthalmia neonatorum is recorded. Of this total 84.5 per cent occurred within the first 10 days of life; there were rather fewer in the first 5 days of life than in the second. The incubation period varied with the exciting organism. With the gonococcus some 70 per cent were observed in the first 5 days of life, with diphtheroids some 50 per cent and with *S. aureus* some 37 per cent, whilst with the virus of inclusion blennorrhoea there were only occasional cases in the first 5 days of life. As to severity, cases of moderate severity predominated in the series as a whole, but with gonococcal infections severe cases were as common; severe cases were infrequent with *S. aureus*. There was nothing to suggest that in an unselected series severe cases are substantially less frequent in the second 5 days of life than in the first.

My thanks are due to Dr. E. N. Young of the Southern Group (London County Council) Laboratory for her bacteriological and cytological examinations, and to Sister Condon of White Oak Hospital for her loyal collaboration.

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Further Observations on the Basal Temperature in Sterile Women

BY

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IN the opinion of all investigators the two most important causes of female sterility are tubal occlusion and failure of ovulation in women who menstruate normally.

While the diagnosis of tubal occlusion is now easy, thanks to the Rubin test and to salpingography, the investigation of ovarian activity still offers many difficulties.

Among many methods used for this purpose, endometrial biopsy has been considered the most reliable.

During the last few years Rubenstein and Lindsley (1937), Zuck (1938), Barton (1940), Davis (1946), and others in the American literature, Tompkins (1945), Barton and Wiesner (1945a), and Halbrecht (1945), in the British, and Palmer (1943), in the French literature have reported observations of the cyclic temperature-curve in normally menstruating women—the phenomenon observed by Van de Velde more than 40 years ago—and they suggest the use of this to study the activity of the ovaries.

The results of their observations in thousands of cases have established the reliability of this method. Our own studies of 425 sterile women who measured their temperatures in 1,184 cycles, not only confirm those results, but have also enabled us to observe certain characteristics of these temperature-curves that had hitherto remained unnoticed.

These variations of the basal temperature-curves of sterile women seem to us to be not accidental but very significant.

Variations of the Bi-phasic Curves.

The length of the premenstrual phase (we purposely do not call it the "luteal phase", because we do not yet definitely know how the rise in temperature in this phase is influenced by the corpus luteum) in relation to the postmenstrual phase is more or less constant, although variations of 2 to 3 days are not rare in the same woman. Generally the premenstrual phase varies between 10 to 16 days. Short premenstrual phases of 6 to 9 days are generally rare. They recur frequently, however, in the same woman. Still less frequent are long phases of 16 to 18 days. A temperature that remains elevated for longer than 20 to 22 days definitely indicates pregnancy. In those rare cases in which bleeding occurs about 22 days after the beginning of the second phase we are probably dealing with an early abortion rather than with delayed menstruation (Fig. 1).

The differential diagnosis of delayed menstruation and early abortion is especially important when considering the proper therapy for infertility. In many cases the

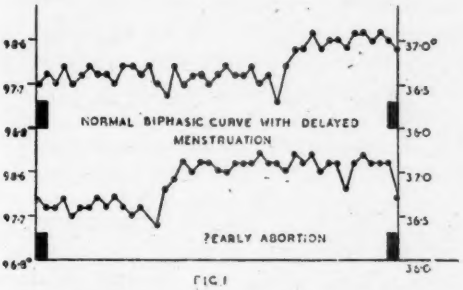


FIG. 1

temperature remains at about the same level in both halves of the cycle. The halves are, however, separated by a drop in temperature lasting 1 to 3 days (Fig. 2).

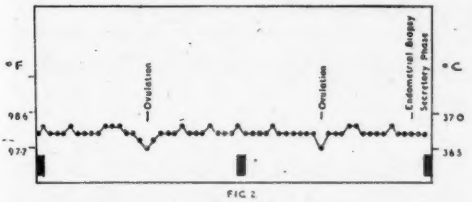


FIG. 2

This drop in the temperature-curve seems to coincide with the time of ovulation but is not followed—as is normally the case —by an elevation of temperature. The assumption that this variation of the curve is to be considered as being bi-phasic and that it permits the diagnosis that ovulation has taken place was confirmed by endometrial biopsies at the end of many such cycles.

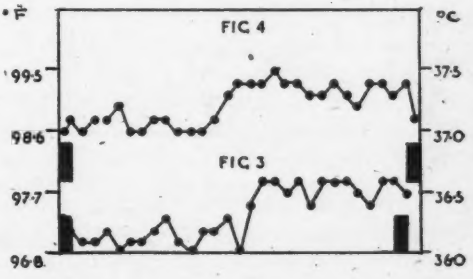
High and Low Basal Temperatures.

In 80 per cent of the women investigated, the oral basal temperatures varied between 36.4 and 36.8°C. in the postmenstrual phase and between 36.9 and 37.2°C. in the premenstrual phase of the cycle.

Fifteen per cent of the women had constantly a morning oral temperature below 36.4°C. in the postmenstrual phase, in many cases even below 36°C., and a corresponding elevation in the premenstrual phase. These low temperatures remained at the same level during the whole period they were measured and were not influenced by any hormonal or thyroid therapy (Fig. 3).

We could find no connexion between these low temperatures and the basal metabolic rates. On the contrary, we found the basal metabolic rate to be somewhat elevated, varying between plus 2 and plus 28, in 35 cases of low temperatures in which we measured the basal metabolic rate. It seems to be a matter of individual constitution rather than a symptom of hormonal dysfunction.

Rarer were the cases of patients with constantly elevated temperatures who measured above 37°C. in the postmenstrual phase and 37.3 to 37.5°C. in the premenstrual phase (Fig. 4).



In all these cases which amounted to no more than 5 per cent of the total number investigated, we could find no organic reason for the elevated temperature.

This variation of temperature curve could not be influenced either by hormonal —estrogenic therapy. Their basal metabolic-rate was normal. This too seems to point to a constitutional factor.

The Influence of Hormone Therapy upon the Basal Temperature.

Most investigators ascribe the elevation of the temperature during the second half

of the cycle to the influence of the hormone produced by the corpus luteum. Barton and Weisner (1945b) seem to have succeeded in getting the same result artificially by injecting progestin.

Our own experiments lead us to results different from those of other investigators:

1. Daily injections of 10 mg. progestin did not produce any elevation of temperature in an apparently healthy male.

2. In 28 women who had normal biphasic temperature-curves, we obtained the following results after injecting 10 mg. of progestin every other day beginning with the 15th day of the cycle.

(*a*) In 11 women we succeeded in advancing the menses by 4 to 8 days; and the premenstrual phase, with the elevation of temperature, seemed to be shortened (Fig. 5).

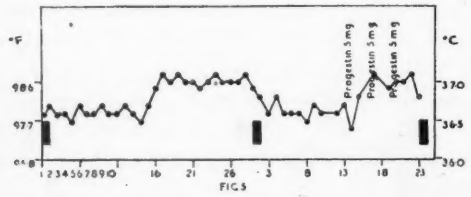


FIG 5

(*b*) In 4 other women who had biphasic temperature-curves before starting the injection of progestin, the curves changed to the monophasic type and the menses were advanced about 6 to 8 days (Fig. 6).

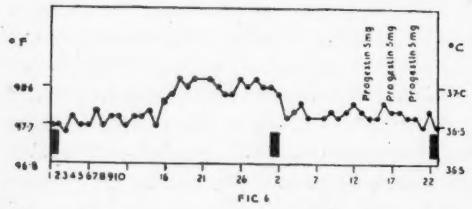


FIG 6

(*c*) In 6 women with monophasic cycles the temperature-curves remained uninfluenced in spite of large doses of progestin (Fig. 7).

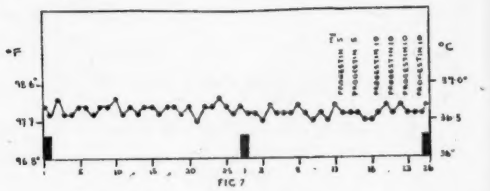


FIG 7

(*d*) Only in 1 case the temperature rose after progestin, causing an otherwise monophasic cycle to become biphasic (Fig. 8).

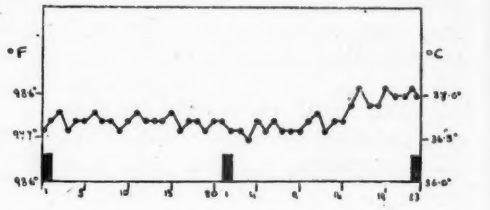


FIG 8

Thus we could not find a case in which progestin had a positive influence on the temperature-curves. The negative results we observed in 4 cases seem to have been caused by the early event of the menses before ovulation could take place. All this leads to the conclusion that the rise in temperature during the second half of the cycle, although hormonal in character, is not caused by a pyrogenic influence of the corpus luteum. The mechanism of the elevation of temperature in the premenstrual phase is probably more complex. We have not succeeded in lowering the temperature by using oestrogens, as some investigators report; nor did we succeed in influencing the basal temperature by the use of thyroid preparations.

The Monophasic Curves.

In 222 cycles investigated (19.5 per cent) the temperatures were monophasic. These cycles have to be considered as being anovulatory. The result of measuring

temperatures during a single cycle only is not sufficient to determine the ovarian functioning. Anovulatory cycles are not rare even in otherwise normal and fertile women. A questionnaire answered by 250 pregnant women showed that 52 of them had conceived only after 3 to 12 months of normal cohabitation, this permitting the assumption that at least some of them had anovulatory cycles.

The monophasic curve in a single cycle does not mean anything more than that the particular cycle is anovulatory. It is necessary to measure the basal temperature of at least 3 cycles in order to determine accurately the woman's true fertility. The longer a woman measures her temperatures the more accurate will be the determination of her chances of pregnancy (Fig. 9).

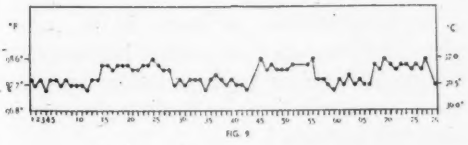


Fig. 9 shows that among the 128 women who measured their temperatures during a single cycle only, 32, that is, about 27 per cent, had monophasic curves, whereas the percentage of completely anovulatory women tends to become smaller the longer the temperatures are measured; that is, about 18 per cent if they measured 2 cycles and only 3 per cent if measured during 4 cycles.

The number of normally menstruating women who do not, sooner or later, have a spontaneous ovulation is also very small. This explains the fact that many women become pregnant, without treatment, after being sterile for many years. As mentioned before, we used the basal temperatures as an indicator of the efficacy of our therapy. Only rarely did an ovulation follow hormonal therapy (pregnant mare's serum, etc.). More often was this the case after X-ray therapy to the ovaries and the hypophysis.

The Basal Temperature in Cases of Amenorrhoea.

In 13 cases of amenorrhoea the temperature was monophasic during 2 or 3 months. In 2 other cases where the measuring of temperatures was continued for 4 to 5 months until the menses appeared spontaneously, the temperature rose during the last 14 days, thus becoming biphasic. This phenomenon explains those cases of pregnancy that occur during a period of amenorrhoea.

In 1 case of primary amenorrhoea biopsy showed an atrophic endometrium and tuberculous endometritis. The temperature-curve of this woman nevertheless showed a cyclic biphasic rhythm (Fig. 9).

It is therefore possible that this patient ovulates every 4 weeks without participation of the endometrium in the process. On the other hand, it is possible that the biphasic rhythm of the temperature is influenced by other factors as well.

Basal Temperature and Endometrial Biopsy.

In 90 cases we were able to compare the basal temperatures with endometrial biopsies taken during the same cycle. In all but 3 cases the results were identical. In 1 of these 3 cases the temperature-curve was monophasic while the endometrium was, in part at least, in the secretory phase. In the other 2 cases the curve was biphasic while the endometrium was quiescent. One of these women became pregnant after a few months.

On consideration it seems that the basal temperature is more reliable than the endometrial biopsy, at least for the purpose of

determining the time of ovulation. Our reasons are as follow:

1. Biopsy allows investigation of only a small part of the endometrium and it is known that the endometrium does not react uniformly in all its parts to hormonal stimuli.

2. It is easy to continue measuring temperatures during a long period, whereas it is difficult, and not without danger to the patient, to repeat the endometrial biopsy frequently.

3. Only 46 out of 1,184 curves (less than 3 per cent) were unusable, whereas the number of biopsies that do not permit a definite interpretation is much larger.

The Technic of Measuring Basal Temperatures.

There is no practical difference in reliability between the oral, rectal or vaginal temperatures and most patients prefer the oral method. The axillary measurement, however, is quite unreliable.

The best time to measure the temperature is in the morning before rising. It is particularly important to insist upon its being done before the woman leaves the bed, a point which is frequently disregarded. A few minutes after leaving bed the temperature will show a drop of °F. (0.1 to 0.3°C.) and not until later, after physical activity, does it rise again.

Summary.

1. The basal temperature-curves in 1,184 cycles of normally menstruating sterile women were definitely biphasic and in 23 cases, probably so. On the other hand, 222 cycles were monophasic and in 46 cases the curves had to be discarded.

2. Temperature-curves allow us not only to diagnose very early pregnancy, but also to differentiate between delayed menstruation and early abortion.

3. In many women, ovulation seems to effect no more than a drop of 0.1 to 0.3°C. during 1 to 3 days of the intermenstrual mid-cycle without any elevation of temperature in the premenstrual phase above the postmenstrual phase.

4. About 15 per cent of all women investigated, had temperatures below 36.4°C. in the postmenstrual phase and a correspondingly elevated temperature in the second half of the cycle. Five per cent of the patients invariably had temperatures above 37°C. These high and low temperatures seem to be constitutional and cannot be influenced by hormones.

5. Thyroid extract, progestin, and oestrogens do not change the temperature-level. The rise in temperature in the second half of the cycle is caused by a complex mechanism, lutein being probably only one of the many factors.

6. Amenorrheic women have monophasic curves. In many cases, however, the temperature rises 14 days before spontaneous menstruation, indicating that ovulation has occurred.

7. In 90 cycles we could compare the basal temperature curves and endometrial biopsies. Eighty-seven cases showed identical results with both methods.

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A case of Spontaneous Extra- and Intra-Peritoneal Rupture of a Hydronephrosis in Pregnancy

BY

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THE following case is reported because of its rarity and because, so far, a similar one has not been found in the literature.

A woman, 37 years of age, in her third pregnancy, was admitted to St. Mary's Hospital, Manchester, one afternoon for investigation of the renal tract. She had haematuria, persistent for the last 2 months. About a year before she had had " kidney trouble " with pain in the right lumbar region lasting for 3 to 4 days. At that time there were no urinary symptoms. During the 3 months prior to admission, she had noticed a lump in her right side, which did not increase in size. For the last 2 months, there had been blood in her urine; this improved by rest in bed for a week. She had also had a dull aching pain in the right lumbar region occasionally passing down into the groin.

On admission her general condition was satisfactory, her colour was good, pulse-rate 68, blood-pressure 135/75 mm. Hg. The size of the uterus corresponded to the period of amenorrhoea (34 weeks) and the foetal heart-sounds were present.

In the right lumbar region there was a swelling, tender on pressure, difficult to define and considered possibly to be renal in origin. The other systems were normal. The laboratory findings at this time were:

Blood. Haemoglobin, 72 per cent; red-blood cells, 4,330,000; white-blood cells, 11,875; polymorphs, 26 per cent; mononuclears, 74 per cent; platelets, abundant; colour index, 0.85.

Blood urea. 31 mg./100 ml.

Blood group A (2).

Urine. Numerous red-blood cells in wet film. Culture, sterile.

The patient's condition remained satisfactory until the following morning, when she vomited 3 times. The last attack, occurring about 7.30 a.m., was associated with a bout of coughing. Her general condition then deteriorated. She was pale, with sighing respiration, pulse 124, blood-pressure 80/60. foetal heart sounds were not audible.

Inspection of the abdomen showed a decrease in movement. On palpation it was now guarded, with deep tenderness in both flanks. The uterus was irritable. Percussion in the flanks showed the presence of shifting dullness. Rectal examination revealed that the foetal head was low in the cavity of the pelvis and that there was no tenderness in the Pouch of Douglas. There was no loss of blood *per vaginam*. A catheter specimen of urine obviously contained blood.

A provisional diagnosis was made of intra-abdominal haemorrhage, originating from a renal tumour, probably a hydronephrosis.

Mr. W. Thompson, F.R.C.S. (Resident Surgical Officer at the Manchester Royal Infirmary), confirmed this view and it was considered that a laparatomy was indicated.

A blood transfusion was commenced and the patient taken to the theatre (8.30 a.m.), after hypodermic morphia, gr. ¼; atropine, gr. 1/60.

A right upper paramedian incision was made. The abdomen contained 2 pints (1,200 ml.) of blood-stained fluid. A cystic swelling in the position of the right kidney, and a retroperitoneal haemorrhage were next observed. The left kidney was normal. The swelling was exposed by retracting the hepatic flexure of the colon downwards and the duodenum medially. Further dissection revealed a large hydronephrosis into which haemorrhage had taken place. The posterior parietal peritoneum was incised and the hydronephrotic sac was opened. A half-pint (300 ml.) of blood clot was evacuated. The kidney and sac were dissected free and

removed. Further blood loss was minimal. The abdomen was closed in layers after stitching the hole in the posterior peritoneum. A stab-drain was brought out in the right hypochondrium.

Total blood loss was estimated to be nearly 3½ pints (2 litres). Transfusion was continued until the administration of 4 pints (2,400 ml.) was completed.

Post-operative treatment.

This consisted of adequate sedation (morphia, gr. ⅙, 4-hourly, for 24 hours), gradual daily shortening of the drainage tube and the administration over a period of 24 hours of 4 pints of 20 per cent dextrose solution intravenously to provide fluid and to promote diuresis.

At 5.30 p.m. on the day following the operation, labour started and the membranes ruptured shortly afterwards. The patient delivered herself by natural forces of a stillborn macerated foetus weighing 4 pounds. The total time in labour was 1½ hours. From this event, until the end of her period in hospital, 21 days in all, the patient underwent a normal convalescence. Her condition on discharge was excellent.

ADDENDA.

Pathological Report. Hydronephrosis. Kidney measures 5 by 3 inches with a cystic cavity measuring 5 by 4 inches. Numerous haemorrhagic areas in wall of cyst and in substance of kidney.

Laboratory Reports.

Fifth day (post-operative) *Blood.* Haemoglobin, 62 per cent; red-blood cells, 3,310,000; colour, index, 0.95.

Twelfth day (post-operative). Blood urea, 30 mg. / 100ml.

My thanks, for permission to publish this case, are due to Dr. W. R. Addis, under whose care the patient was admitted, to Mr. W. Thompson who performed the operation, and to Dr. C. Scott Russell for his guidance in composing this report.

The Use of a Hodge Pessary for Correcting Backward Displacement of the Uterus*

BY

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ALTHOUGH it is generally agreed that a mobile retroversion or retroflexion of the uterus is usually symptomless, its correction as a temporary measure is sometimes indicated for purposes of diagnosis, during early pregnancy or the puerperium and in cases of infertility, etc.

In such circumstances it is usually taught that the position of the uterus should be first corrected by bimanual manipulation as a temporary measure is sometimes volsellum, and that thereafter the position of the uterus should be maintained by inserting a pessary. The best pessary for this purpose is probably the Hodge, or one of its modifications; a ring is not so satisfactory but may have to be used if the retroversion is associated with prolapse or a defective perineum. However, reposition of the uterus by the accepted method is not so easy a procedure as it appears, and is as a rule beyond the capacity of anyone without special experience and training. Indeed, many gynaecologists often find it necessary to resort to general anaesthesia in order to perform the manoeuvre, especially in nulliparous women. The secret in any case is to manipulate the cervix rather than the body of the uterus itself. One of the difficulties is that the uterus is not always within easy reach, moreover it may return to its former position when the operator removes his fingers to pick up the pessary for insertion.

It is now well established that in the comparatively rare cases in which an impacted retroverted gravid uterus does not correct itself spontaneously, and cannot be replaced, a useful procedure is to insert a large-size ring pessary, and the continuous pressure causes a gradual correction of the position of the uterus. The object of this note is to point out that in all cases, no matter whether the woman be pregnant or otherwise, the easiest way to correct retroversion or retroflexion is to do it with the pessary itself. The pessary, however, is used as a lever on the cervix and not as an agent for exerting pressure on the fundus as in the case of the impacted uterus mentioned above.

Procedure.

With the patient in the left lateral position and the uterus still retrodisplaced, a suitably sized Hodge pessary is inserted and allowed to take up its own position. It will be found that the upper rim naturally comes to lie in the anterior fornix, the lower bar projecting just beyond the introitus (Fig. 1). One or two fingers are then inserted behind the lower bar, through the pessary and in front of the upper rim. Pressure is exerted backwards on the upper end, which is pushed against the anterior aspect of the cervix (Fig. 2). If the upper end of the pessary is out of reach the fingers

* Read before the North of England Obstetrical and Gynaecological Society, 4th July, 1947.

can be placed on anterior aspects of the side bars as high up as possible. With continued pressure the cervix is deflected backwards and the body of the uterus begins to rotate forwards. Ultimately the upper end of the pessary slips past the cervix into the posterior fornix and into its correct position (Fig. 3). By this time the retroversion is nearly always automatically corrected. Sometimes it is only partially corrected, the uterus lying with its axis vertical. In such cases the upper end of the pessary is pushed firmly against the posterior vaginal wall just behind the cervix, and the posterior fornix "stroked" backwards and slightly downwards with the pessary (Fig. 4). At the same time the lower end of the Hodge comes to lie at a higher level against the anterior vaginal wall. The cervix is thus levered further backwards, the fundus uteri comes forwards, and the pessary is at the same time left in its proper place.

There is a knack in carrying out the operation, but once it is learned the method is extremely simple and can be carried out without much experience. I have rarely known it to fail except when the uterus is fixed by adhesions; indeed, it can be employed as a test of mobility. Except in the case of virgins it is never necessary to administer an anaesthetic. The manoeuvre causes the patient such little disturbance that she does not realize that it has been carried out. One of the advantages of the technique is that it does not involve any pressure on the body of the uterus and it can be applied during early pregnancy, even in patients who habitually abort, without any risk of causing an abortion. Indeed, it is so easy, painless and safe that there is much to be said for using it as a routine when a retroverted gravid uterus has not corrected itself by the 8th or 10th week, rather than take the admittedly small risk that the uterus will become

FIG. 1.

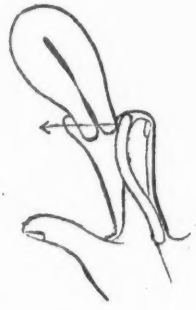

FIG. 2.

FIG. 1.

Insertion of Hodge pessary with uterus in position of retroversion. The upper end of the pessary comes to lie in the anterior fornix.

FIG. 2.

One (or two fingers) inserted through the pessary, the upper end of which is pressed firmly backwards against the cervix.

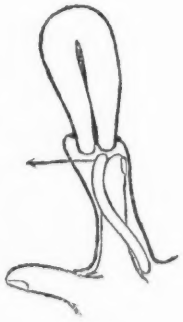

FIG. 3.

FIG. 4.

FIG. 3.

As cervix moves backwards and fundus begins to rotate forwards, the upper end of pessary slips behind the cervix into posterior fornix.

FIG. 4.

If uterus is not already in good position, anteversion is increased by pressing the upper end of pessary further backwards and slightly downwards. The cervix is thus pulled backwards by putting tension on the posterior vaginal wall and the overlying tissues.

impacted. The method is also useful in the puerperium, when tenderness of the vaginal walls and perineum may make the usual manipulation both difficult and painful. If the vaginal walls and perineum are atonic, however, a Hodge pessary may not be retained and a ring pessary is necessary. The same technique can be carried out with a ring, but it is perhaps not quite so efficient.

The manoeuvre whereby the pessary is slipped from the front to the back of the cervix as recommended here is by no means original. It is described in most textbooks, both new and old, as a standard procedure *after* manual replacement of the uterus. The suggestion here is that it should be carried out *before* replacing the uterus and as a means of replacement.

Pyrexia as a Sign of Endometriosis*

BY

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IT is a well-established clinical observation, but one which in practice is sometimes overlooked, that the presence of free blood in the peritoneal cavity often causes a rise in temperature. Haematoperitoneum can give rise to a clinical picture not easily distinguished from septic peritonitis—pain, tenderness, distension, vomiting, ileus and pyrexia. Slight pyrexia is sometimes seen in cases of tubal abortion and pelvic haematocele and may lead to an error in diagnosis. The rise in temperature which is not uncommonly seen for 2 or 3 days after operation and which is labelled "reactionary" is probably due to some oozing of blood into the peritoneal cavity or into tissues at the site of operation. The "reactionary" temperature is more noticeable and more prolonged when there has been much separation of adhesions or difficulty in achieving complete haemostasis.

Bearing in mind these considerations it might be expected that endometrioma, a condition in which haematoma formation is characteristic and in which blood cysts sometimes discharge their contents into the peritoneal cavity, could cause pyrexia. Such an association is not mentioned in textbook descriptions of endometriosis, yet it not only occurs, but is sufficiently frequent to be of practical importance.

My attention was first drawn to this point in 1939 when a doctor asked me to see his wife who, at the age of 33, was complaining of severe dysmenorrhoea, and during each period had noticed a rise in temperature up to 100°F., this being associated with a good deal of malaise. She had wide-spread pelvic endometriosis which required radical surgery, and after the operation she has remained well and free from menstrual pyrexia. Since that time all patients in whom endometriosis was suspected have been asked whether their temperature altered during menstruation. It has proved exceptionally difficult to get information on this question. Most women attribute their general malaise to the severe pain or to the period itself, and do not trouble to take their own temperature. Amongst the hospital class of patients in particular it is almost impossible to get any reliable evidence; private patients, however, tend to be rather more observant.

During the past ten years 120 cases diagnosed as pelvic endometriosis were seen in private practice, but the diagnosis was proved only in 91, the remainder being treated without operation. Among the 91 there were 10 cases in which the occurrence of pyrexia was a significant clinical feature —noticed by the patients and recorded. In 2 of the 10 cases, however, operation revealed evidence of inflammatory appendage disease as well as pelvic endometriosis, and these are excluded. Among the remaining 8 there was no sign of infection either in the pelvic organs or elsewhere, and in all cases removal of the growth, or the major portion of it, was followed by complete resolution of the temperature; this

* Read before the North of England Obstetrical and Gynaecological Society, 4th July, 1947.

was permanent except in 2 cases where a return of pyrexia coincided with a recurrence of the growth. In one of these the activity of the tumour and menstruation itself was suppressed for 14 weeks by giving androgens. During this time the patient experienced neither pain nor pyrexia, but both returned when the treatment was suspended.

The degree of pyrexia was not gross in these cases, 101 to 102°F. being the highest noticed by the patients. Its occurrence too was variable; sometimes it was present intermittently throughout the menstrual cycle, but typically it occurred cyclically during menstruation, gradually disappearing during 1 or 2 days after the flow ceased.

It seems likely that pyrexia is a feature of active endometriosis more frequently than these figures suggest. The 91 cases include all types of case—uterine endometriosis, a growth which often does not menstruate, small patches of endometriosis occurring on an exposed surface such as the abdominal wall or perineum, and growths which were almost certainly functionless in that they were found incidentally during operations on post-menopausal women. Above all there remains the probability that menstrual pyrexia often passes unnoticed. In this connexion it should be pointed out that of the 8 patients who reported pyrexia, 4 were members of doctors' families and were under prolonged and expert observation.

Body temperature normally varies with the menstrual cycle, but the peak occurs pre-menstrually and the onset of the flow is characterized by a fall. A rise in temperature during each menstrual period should, therefore, be regarded as significant of some pathology. It may occur sometimes in pulmonary tuberculosis when the lesion appears to be more active during menstruation. It might presumably occur with genital tuberculosis, but in gonococcal or pyogenic salpingoöphoritis it would not be likely to continue for more than a few months at most. It might also be noticed in women who have retrograde menstruation. However, I can only recall one patient who had a long-standing menstrual pyrexia and in whom there was no evidence of pelvic endometriosis. She too was a doctor's wife, a young nulliparous woman who for nearly 2 years had a temperature of 99°F. with each period. Her husband had phthisis, but there was no evidence of this so far as she was concerned. No pelvic abnormality was found; she had no treatment, and after some time the menstrual pyrexia cleared up; she subsequently had children, and has remained well for 6 years since.

The importance of recognizing that pyrexia may be produced by endometriosis is in regard to the differential diagnosis between this condition and pelvic infection. This aspect is emphasized by the details of a recent hospital case (not included in the above).

The patient, E.H., was single, aged 26 and a nurse. She was admitted with a history of 2 weeks' lower abdominal pain associated with a temperature rising to 100–101°F. She had had dysmenorrhoea during the last 3 periods only, some intermenstrual yellow discharge and occasional slight intermenstrual bleeding. Eight years previously she had had an appendix abscess, necessitating 2 abdominal operations. On examination she was found to have a retroverted uterus with restricted mobility, and although neither appendage was palpably enlarged, both were acutely tender, especially the left. The urine was normal. A diagnosis of acute salpingitis was made, although there was no increase in blood sedimentation-rate and no leucocytosis. Treatment by rest in bed, hot vaginal douches, intrapelvic heat applied with Elliott's apparatus, sulphadiazine (35 g. in 5 days), penicillin (2 courses of 450,000 units and 2,200,000 units respectively), failed to have any dramatic effect. The pyrexia continued intermittently and attacks of pain recurred, although

the pelvic organs became rather less tender on examination. The highest temperature recorded was 102°F.; the pulse-rate varied between 80 and 130. Other investigations, X-ray of chest, blood-culture, bacteriological examination of faeces and urine, serum-agglutination tests, all gave negative results and ultimately it was decided to carry out laparotomy. This was done 7 weeks after admission when, after a remission, she had another attack of pain and the temperature began to rise again. No sign of inflammation was found in the lower abdomen or pelvis and not a single adhesion remained as a result of the appendix abscess. The genital organs were normal except for a patch of endometrioma on the surface of the left ovary. This was not more than 1 cm. in diameter and there were no adhesions to it. There was a little free blood in the pelvis which may have come from the surface of the growth, or may have escaped from the uterus along the Fallopian tubes. In either case it might have been precipitated by examination under anaesthesia prior to laparotomy. The affected area of ovary was resected and the diagnosis subsequently confirmed by microscopic examination. The patient's temperature was normal within 24 hours of operation and she remained apyrexial until her discharge from hospital 16 days after operation. She has remained well during the subsequent 6 months.

In this case there was not any sign of long-standing intra-pelvic haemorrhage at the time of operation, and there were no adhesions; the total area of growth was small and only minute blood cysts were present. Even so, it would appear that the endometrioma was sufficient, in a patient whose heat-regulating centre may have been unusually sensitive, to cause a considerable rise in temperature—and this in turn made the diagnosis difficult.

The occurrence of pyrexia in association with endometriosis is also mentioned by Holmes (1942). In his series of 80 proved cases its incidence was 8.7 per cent.

REFERENCE.

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Plastic Surgical Treatment of Congenital Transverse Diaphragms of the Vagina

BY

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ONE of the rare congenital anomalies of vaginal development is the transverse diaphragm. Rubin (1944) gives to this anomaly the name "cervical phimosis." There may be one or more partitions, the formation of which brings to mind the vagina of the ewe which bears transverse circular folds.

As Petsalis (1936) has proved, these congenital transverse diaphragms of the vagina are due to the incomplete dissolution of the epithelium which fills the Müllerian ducts during foetal life even after the coalescence at their caudal end. This incomplete dissolution may occur at one or more points, thus forming one or more occlusions. If only one of these exists it is usually found in the upper vagina. The diaphragms thus formed may bear one or more miniature openings either in the centre or the periphery, not differing histologically from the vaginal walls.

Provided there is an orifice in each of these partitions menstrual flow occurs regularly and no haematocolpos is formed. Diagnosis of this anomaly can, therefore, only be made after marriage as the congenital diaphragms completely conceal the cervix and thus hinder normal intercourse, fertility or delivery.

As soon as such a diagnosis is confirmed surgical treatment is indicated. The procedure adopted until quite recently was the circular excision of the diaphragm and suturing of the raw area. This operation caused a stenosis of the vagina in the form of a non-expanding ring at the place of the excised diaphragm. Dannreuther (1944) used the transverse incision of the occluding transverse membrane which however does not eliminate the disadvantages in as much as it does not give the vagina its normal size and perimeter.

In an effort to avoid any such disadvantages a modified Petsalis method was used with full success in the following case.

CASE REPORT.

V. M. D., aged 26, married 3 years, nullipara, menstrual flow normal, duration 3 to 4 days.

First examined on July 14th, 1944, complaining of dyspareunia with subsequent insomnia and neurasthenia. Bimanual examination revealed an obstruction preventing the introduction of the finger further than 2 inches inside the vagina. Upon inserting the Kristeller's vaginal retractor No. 2 as far as it could go a transverse diaphragm with a small opening in the centre, about 3 mm. diameter, was revealed. Rectal bimanual examination revealed a normal-sized retroverted uterus and normal adnexa.

On May 29th, 1945, an operation according to the Petsalis method was carried out as follows:

Using knife-handle No. 4, blade 22, the first radial incision (*AB*) was made, from the existing opening of the diaphragm to its base (Fig. 1). The result of this incision gave 2 triangular surfaces *BAC* and *BA'C* (Fig. 2).

After picking up points *A*, *A'*, *B* and *C* with Kocher forceps the sides *BAC* and *BA'C* were undercut to a depth of 1 cm. with knife handle No. 4, blade 23, thus giving a diamond *BACA'* (Fig. 3).

Silk 3-0 was passed and tied from point *C* to *B* of the diamond (Fig. 4) thus drawing the edges together to form a transverse line *AA'* (Fig. 5).

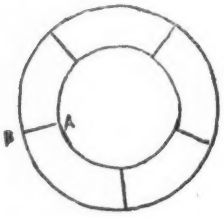

FIG. 1.

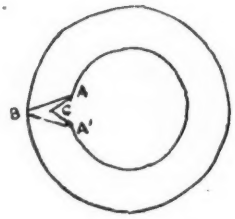

FIG. 2.

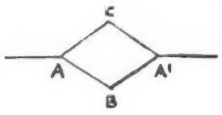

FIG. 3.

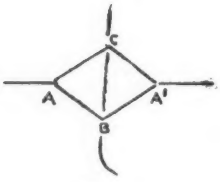

FIG. 4.

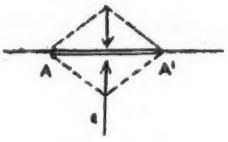

FIG. 5.

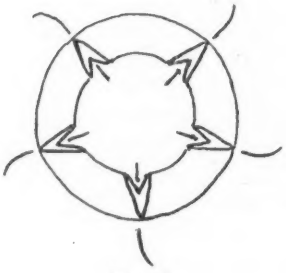

FIG. 6.

(In order to show the method of incision and suture, the central perforation has been greatly exaggerated. Diagram from Petsalis with slight alterations.)

The same procedure was carried out in all 5 incisions consecutively (Fig. 6).

The end of the operation revealed the hitherto concealed cervix. Then the whole vagina was painted with Mercurochrome solution, packed with gauze and left for 24 hours. The 9th day after the operation the silk sutures were removed and the patient was discharged on June 12th, 1945. She was asked to report a month later for examination.

She came on July 15th, 1945, and normal bimanual examination was easily made without any discomfort to the patient. The Kristeller's vaginal retractor No. 3 was easily inserted to the full depth of the vagina and the cervix was clearly observed. Distention, with both blades of the retractor, was accomplished without difficulty or causing pain. At the level of the operation 2 small atrophic folds were observed similar to *carunculae myrtiformes* in appearance.

The advantage of this surgical method is that the resulting transverse scars being parallel to the normal folds of the vagina do not hinder its dilatation at the site of the once existing diaphragm.

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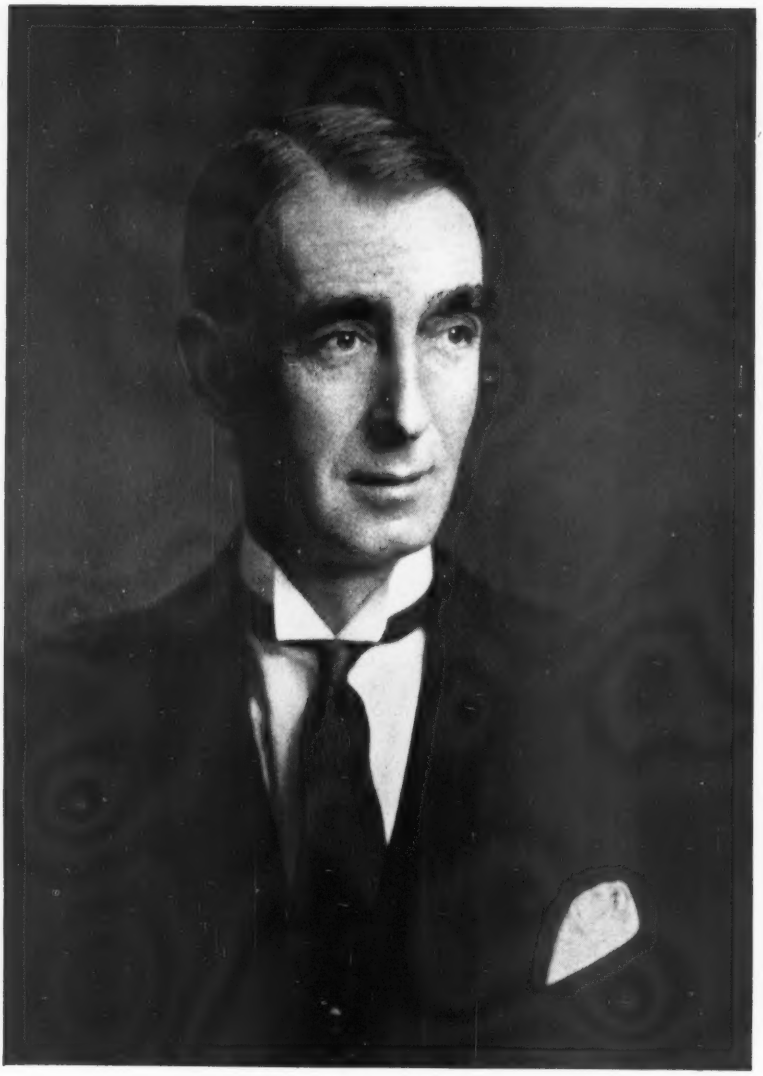

LOUIS CARNAC RIVETT

Obituary

LOUIS CARNAC RIVETT

M.Chir., F.R.C.S., F.R.C.O.G.

LOUIS CARNAC RIVETT died in the Middlesex Hospital on 5th September, 1947, after a long illness borne with heroic gaiety and fortitude.

He was born in Stockport, Cheshire, in 1888, son of the high sheriff of Caernarvon. Educated privately and at Trinity College, Cambridge, he graduated B.A. in 1909, and continued his medical education at Middlesex Hospital, obtaining L.R.C.P., M.R.C.S. in 1912. He filled the posts successively of house surgeon, casualty surgical officer, and obstetric house surgeon, at Middlesex Hospital, and obtained the F.R.C.S. (Eng.) in 1915, and M.Chir. (Camb.) in 1916. His career in obstetrics and gynaecology was interrupted by service in the Army and R.F.C., Medical Branch. The end of the 1914–18 war saw him as surgeon in charge of the Anglo-French Hospital at Le Tréport. Returning to obstetrics and gynaecology he was appointed to the staff of Queen Charlotte's Hospital and the Chelsea Hospital for Women, the Royal Masonic Hospital, King George's Hospital, Ilford, and the Cottage Hospital, Welwyn. In 1930, on the retirement of Sir Comyns Berkeley, he joined the Honorary Staff of Middlesex Hospital.

He was examiner in his specialty for the Universities of Cambridge and Bristol and the Conjoint Board, and was part author of the *Queen Charlotte's Hospital Practice of Obstetrics* (1st edition, 1927) and *Sex Ethics* (1934). In addition he read many papers before the Royal Society of Medicine and the Hunterian Society, and was a regular attendant at the meetings of these bodies, when he nearly always had something to contribute of acumen and experience, salted with a pleasant dry humour. On the foundation in 1929 of the Royal College of Obstetricians and Gynaecologists he was made a foundation member and represented the members of the Council until 1936, when he was created F.R.C.O.G. He was editorial advisor to the Section of Obstetrics and Gynaecology of the Royal Society of Medicine, Honorary Secretary for some years of the Section of Obstetrics and Gynaecology of this society and Secretary of the National Birthday Trust.

This tells only part of his extraordinarily busy life, for he was on innumerable committees where his judgment, his tact and good humour made him invaluable. He found time to travel abroad and on two occasions visited the U.S.A.; on the second visit he was made an Honorary Member of the American Gynaecological Society.

Louis Rivett was an able and sympathetic clinician and an excellent teacher, but as a surgeon he was in the front rank. He carried his imperturbability into the

operating theatre, where he combined it with a high degree of manual dexterity that made his performances the wonder and delight of beholders from all over the world. Legend has it that he completed a subtotal hysterectomy in 7½ minutes and a total in 10, and I have seen him do a classical Caesarean section in 17 minutes. Such celerity derived from his extraordinary technical skill, his careful preparation beforehand, his deep experience; considerations of showmanship came last. Rivett never seemed to be in a hurry; his many hospital and private patients, his great number of friends, his nursing staff, his medical subordinates, always found that he had time to stop and listen and wait until he had done what he could for them or simply spent a most pleasant time in their company. Generous, and hospitable and very kind, many of the younger generation of obstetricians and gynaecologists in London owe him encouragement and friendship and help in social and professional affairs.

For all his accessibility he was reserved and even shy, but his goodness and strength were never more manifest than in the last 18 months of his life, when the tragic deaths of his wife and his only son were followed by the knowledge of his own mortal disease, all met with admirable courage, and for his own condition a wryly amused interest in the surgical and other treatment to which he was submitted.

There has gone with him something gay and kind that we can ill spare, and the world of surgery is poor of a good citizen.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

A special meeting of Council was held on Friday, 3rd October, 1947, at the College House, with the President, Mr. William Gilliatt, in the Chair.

The Honorary Fellowship of the College was conferred on Professor J. M. Munro Kerr, Professor C. G. Lowry, Sir Ewen J. Maclean and Sir William Fletcher Shaw.

The following were formally admitted by the President to Fellowship:

Gavin Stiell Brown.
Glyn Alexander Davies.
Gerald Patrick FitzGerald.
Alun Morris Johns.
Frederick Gallagher McGuinness.
Ronald McRobert.
Rufus Clifford Thomas.

To Membership:

Henry Bernard Bagshaw.
George Henry Bancroft-Livingston
Isabella Russell Bishop.
James Tweedie Swan Brown.
Gwendoline Eardley Cockrem.
James McDiarmid Corston.
George Archibald Craig.
Kenneth Joseph Robson Cuthbert.
George Laurence Daly.
Rudolf Walter Danziger.
Burjor Cavas Dastur.
Josephine Alice Davidson.
Norman Eric Corrigan de la Hunt.
William Powell Greenlie Dickson.
Ian Donald.
Ian Alexander Donaldson.
Sara Margaret Field-Richards.
Thomas Benedict FitzGerald.
Ian Tuke Fraser.
Alan Macpherson Giles.
Adam McMurtrie Graham.
Earle Francis Beattie Hamilton.
Arthur Jack Hardy.
Lois Edythe Hurter.
David Worsley James.
David Hugh Lees.
Max Lipsitz.
George Ian Louisson.
William Love.
Cecil John MacKinlay.
James Theodore Mair.
Parvati Malkani.
Eileen Cathcart Miller.
Wilfred George Mills.
Philip Rene Mitchell.
James Duncan Murdoch.
Mary Louise Neville.
Edwin Ronald Ormerod.
Horace Gordon Page.
Nancy Perry.
Elliott Elias Philipp.
John Geoffrey Pritchard.
Eric Rawlings.
Elizabeth Margaret Rose.
David Arnold Fletcher Shaw.
Denys John Neal Smith.
Robert Alexander Russell Taylor.
James Walker.

At the termination of the ordinary meeting of Council held on Saturday, 4th October, 1947, Mr. Humphrey G. E. Arthure, London, assumed the office of Honorary Secretary.

A meeting of Council was held in the College House on Saturday, 22nd November, 1947, with the President, Mr. William Gilliatt, in the Chair.

The Honorary Fellowship of the College was conferred on the Rt. Hon. Field-Marshal Jan Christiaan Smuts, P.C., C.M.

The following were formally admitted to Membership of the College:

Robert John McConnell Jamieson.
Joan Edith Warner Mackie.
Stephen Parlee (*absentia*).
Ada Sau Haan Wong (*absentia*).

The following candidates have satisfied the examiners for the Diploma in Obstetrics:

Kenneth George David Abbott.
Edward Anthony John Alment.
Gerald Joseph Amiel.
Geoffrey Anderton.
John Killen Armstrong.
William Constantine Astley.
Winifred Nora Backhouse.
Allin Barrington Backus.
Henrietta Elizabeth Banting.
Charles Patrick Bennett.
William Roy Bodenham.
Charles Christopher Bowley.
Michael Bruser.
Charles John Champ.
John Stanley L'Anson Chesshire.
Stanley Normal Cole.
John Colquhoun.
Janet Ellis Webster Copland.
Joseph Mary Gabriel Costello.
Herbert Henry Crabb.
Robert Crawford.
Reginald Comyn Cummin.
Dominick Vincent Cummins.
Nora Christine Curran.
Reginald Cutts.
Charles Henry De Boer.
Nagala Subhadra Devi.
Christopher John Dewhurst.
Luther William Darley Drabble.
William James Driscoll.
Victor Drosso.
John Geoffrey Dumoulin.
Alan Eckford.
Donald Fleming Edmiston.
Morris Seymour Ellensweig.
John Eskell.
Joseph Firth.
John Henry Fisher.
George Herbert Flack.
Harold Derek Freeth.
Herbert John Friend.
Robert William Grayburn.
Eric Glynn Hall.
Archibald Hanton.
Stephen Lonsdale Hetherington.
Noel Michael O'Connell Hewett.
Gilbert Edward Hicks.
Robert Hodgkinson.
Edmond Ivor Holloway.
David Rees Hughes.
Alexander Hunter.
Robert William Hutchinson.
Charles Gibson Irwin.
Saulat Begum Jahan.
Edwards William Jeyaratnam.
Arthur Joffe.
Frederick William Johnson.
Edward Parry Jones.
Edward Wynne Jones.
Robert Arthur Spink Keighley.
Peter Gilbert Scott Kennedy.
Robert Warton Kennon.
Peter Murray Kerr.
John Edwin Kerton.
Bernard Thomas Kieft.
Muriel Gladys King.
Gouri Kirtane.
William Herbert Laird.
Joseph Lewis Lawrence.
Robert Paterson Lawrie.
John Bateman Lawson.
James McLintock Lees.
Merrick Halden Lloyd.
Mary Love.
Hugh McColl.
Kathleen Anne McDonald.
Richmond McIntosh.
Muriel MacKenzie.
Alistair Gordon MacLeod.
James Crawford MacWilliams.
Arthur Stuart Majury.
Hugh Naylor Mansfield.
Annamma Mathan.
Timothy Kindersley Maurice.
Theodore David Fountain Money.
Ivy Mary Morgans.

Maurice Frank Morton.
William Henry Oesterlein.
Gopal Chandra Pattanayak.
Joseph Henry Patterson.
Peter Cecil Alexandre Posford.
Michael Bertram Quane.
Walter James Ramsay.
Edgar Brian Rayner.
Derek Homer Read.
Denis David Lloyd Rees.
Jocelyn Graham Reynolds.
Henry Roberts.
Paul Savile Robinson.
Eric Stanley Rogers.
Monica Helen Roper.
John Rushton.
Geoffrey Temple Rutherfoord.
Helen Samson.
Mary Aletta Saunders.
Peter Gerard Seed.
Elizabeth Sarah May Sherrard.
David William Shields.
Irene Mary Susan Sloper.
Leonard Smalley.
Alan Ambery Smith.
Edward Michael Southern.
Elizabeth Mary Stokes.
Alan Taylor.
Alexander Percy Walker.
John Watson.
Joyce Watson.
Annesley Eliardo Beresford de Courcy Wheeler.
Joel Wilbush.
Mary Llywela Williams.
Robert Burgess Wilson.
Christopher Harrington Forrester Wood.
Esme Maria Wren.
Ratcliffe Bowen Wright.

BOOK REVIEW

"Utero-tubal Insufflation." By I. C. Rubin. With 159 Illustrations. The C. V. Mosby Company, 1947. 50s.

This is a volume that should be studied by every thinking and teaching gynaecologist, for it is the masterly contribution of a pioneer who began the scientific study of the problem of sterility more than 25 years ago.

Part I discusses the anatomy, pathology and physiology of the Fallopian tubes, drawing special attention to those details of clinical and therapeutic importance which provides food for thought or conjecture; for instance it is shown that the longitudinal folds of mucous membrane are slight and scanty at the isthmus whereas they are thick and multitudinous at the ampulla; and, again, that in the intramural portion of the Fallopian tube there is a sphincter-like action of the muscle at the ostium that undergoes alternate dilatation and contraction. This is of importance not only as regards a passage of gas, but far more so for the passing of the fertilized ovum, for, whereas the force of the non-pregnant uterine contractions is on an average only 0.3 to 0.5 mm. Hg. that of the Fallopian tubes is 30 to 40 mm. Hg. Moreover Dr. Rubin clearly demonstrates that this peristaltic tubal muscle-tone is greatest at the mid-cycle when the ovum must be hurried along the tube, but (and this is the point he drives home) in cases of hypoplasia, the stigmata of which every gynaecologist should know, where there is hypofunction of the ovaries, then the rate and amplitude of the tubal contractions, once any spasm has been countered by octyl nitrite or the like, are minimal. The problem of spasm comes in for much consideration. Admitting that it is most often associated with deranged metabolism, Dr. Rubin thinks that it is of the nature of pyloric spasm and is due to an overstimulated autonomic or an exhausted sympathetic nervous system. The use of various drugs for this condition is discussed. Chapter II is of particular interest to the clinician and demands close study. Dr. Rubin is convinced of the part played by appendicitis in the causation of sterility. His records, using insufflation, bear out those of others working with lipiodol, that not less than 15 per cent of both primary and secondary sterility cases give a history of acute appendicitis. Equally certain is he from his own records that induced abortion is responsible for at least 35 per cent of occluded tubes, the actual site of closure being more often at the intramural portion than in the rest of the tube length and therefore more intractable to surgery; although on this point, Dr. Rubin, like Mr. Victor Bonney, strikes an optimistic note, for he is sure that as technique improves and as more cases are tackled conscientiously and scientifically with the aid of penicillin and chemotherapy the results will greatly improve. For this view he gives chapter and verse and presents some beautiful drawings done at the time of laparotomy which he hopes will convince or help a rising generation of gynaecologists. Part II gives a very full account of the technique and readings of tubal insufflation which cannot fail to enthuse the neophyte even though at present on the English market, we have no apparatus as simple and foolproof as the American model he depicts. Part III deals with the therapeutic aspects of insufflation and this section is that which is perhaps of most guidance to the practising gynaecologist, for facts and figures and comparisons are detailed. It would appear that if one takes an average of all the cases (and they run into many thousands) that 18 per cent of women become pregnant within 2 months of insufflation and that a very definite added proportion become so after that period and/or after repeated insufflations. In this connexion it is interesting to read that out of 590 patients 41.8 per cent had initial gas-pressures above 100 mm. Hg., which may be taken as evidence of impaired patency and would indicate the probability or advisability of repeated blowing of the tubes. For this reason, if for no other, Dr. Rubin thinks the value of the kymograph cannot be overestimated. Another point that is stressed is the effect of contraceptive precautions upon the inci-

dence of immediate future conception. Rubin shows this quite clearly on p. 258 where he categorically asserts that in 50 per cent of those who became pregnant after insufflation there was an interval of at least 2 years before they did so. He states many young women to-day employ precautions only to find, to their surprise, after discontinuing the practice that they cannot become pregnant. He considers that the use of chemicals, pessaries, douches, etc., alter or disorganize for a longer or shorter time the cervical mucosa and bacterial flora of the vagina. Moreover, it is his opinion that the practice of *coitus interruptus* is attended by sequelae as yet not understood which may have a deleterious influence on the mechanism of conception. Assuredly these are weighty words from such an authority.

Part IV surveys the 2 methods of investigation commonly used, namely insufflation and lipiodolography. It is agreeable to find that the author does not condemn oil or viscorayopaque injections although his own views, as he says, have been biased by the fact that in a series of very nearly 10,000 cases there is a record of 17 subsequent pelvic infections, a thing that he states cannot occur after air or gas, a statement that not all would agree with. The probability of accident, he remarks, depends much upon the judgment and skill of the operator. There is little doubt in Dr. Rubin's mind that from a therapeutic and surgico-strategic point of view the technique of hysterosalpingography has to be mastered; moreover for the determination of faults in the development of the Müllerian tract which may be causes of abortion there can be no question of its importance to the surgeon. Finally, for those who may hesitate to purchase this masterpiece, it is perhaps worth recording that out of 41,094 patients who were insufflated, the tubes were patent in 58 per cent, non-patent in 30 per cent, partially patent in 7 per cent, and spasmodic in 5 per cent. The reviewer well remembers the crowded meeting at the Royal Society of Medicine in 1925 when Dr. Rubin first demonstrated his method to an audience in this country and gladly recalls the enthusiasm with which he was greeted. This book is indeed a worthy monument to a life's work.

V. B. GREEN-ARMYTAGE

REVIEWS OF HOSPITAL REPORTS

MEDICAL REPORT OF THE GLASGOW ROYAL MATERNITY AND WOMEN'S HOSPITAL FOR THE YEAR 1945.

This hospital contains 174 beds—73 antenatal, 75 postnatal, 15 for cases of abortion and 11 for patients who require to be isolated. Among 3,933 admissions 2,772 deliveries occurred. Seventy per cent of the cases admitted were considered to be abnormal. This is attributed to the high incidence of malnutrition, overcrowding and rickets in the area served by the hospital. There were 488 cases of abortion. There is also a large outdoor service through which 2,051 women were attended in their own homes where the infants numbered 2,014.

Maternal death occurred in the hospital on 34 occasions (0.86 per cent or 13.32 per 1,000 live-births). Full details of each death are given under the categories, intercurrent diseases 7, complications of pregnancy 8, complications of delivery 13 and complications of the puerperium 6. In the report of a large hospital such as this information of value is to be found whatever the obstetrical interest of the reader. But all obstetricians must find the study of maternal death particularly instructive. From the 10-year survey in the appendix we learn that this figure of 34 is the lowest during that time. Some of these deaths were unavoidable, others were really avoidable but occurred for reasons beyond the control of the hospital; while others—can any large hospital dealing constantly with serious cases claim never to have an avoidable death?

In 4 of the 7 fatalities due to intercurrent diseases congestive heart failure was the responsible factor. To reduce deaths from this cause not only is close co-operation between general practitioner, antenatal clinic medical officer, obstetrician and physician necessary, but instruction of the patient is important. One of these patients had had to spend 2 months in bed prior to delivery in her previous pregnancy. After that she was discharged home "reasonably well". Was she given contraceptive advice or asked to consider being sterilized? Another was treated by her own doctor for "chronic bronchitis and asthma" during the pregnancy and was admitted moribund. How many patients suffering from mitral stenosis, who become pregnant, are told how serious the common cold may be for them, and what to do if they develop a cold? How great the teacher's responsibility!

Among the 8 fatalities classified as complications of pregnancy 6 had eclampsia and 1 concealed accidental haemorrhage. It could not be claimed from the details provided that any one of these was a case of fulminating eclampsia without some warning manifestation. It may be that the riddle of toxaemia must be solved in the laboratory, but in the meantime the teacher must tirelessly reiterate the importance of early diagnosis and the necessity for proper supervision when the diagnosis has been made. The responsible authorities, too, must provide adequate beds for the treatment of these patients—one patient with hypertension (150/100), albuminuria and oedema had to be sent home as a bed was not available.

Of 13 fatal complications of delivery postpartum haemorrhage was a principal factor in 7. Haemorrhage is now the principal cause of maternal death. The treatment of antepartum haemorrhage is fairly satisfactory nowadays. But this cannot be said about postpartum haemorrhage. It is impressed upon the medical student that he must know exactly what to do when confronted with a case of postpartum haemorrhage. Yet even experienced obstetricians differ about its treatment. Midwives attend most of the confinements in this country; but at a recent meeting of the Royal Society of Medicine devoted to this very subject there was uncertainty about what the midwife

should be taught to do when she meets with post-partum haemorrhage. This subject requires further serious consideration.

Of 6 fatal complications of the puerperium, sepsis was a principal factor in 4 (due in one case to perforation of the uterine wall during forceps delivery before admission).

After studying the details of the fatal cases which occurred during the year in this great hospital, the reader must agree that obstetricians have no grounds for complacency in spite of the falling maternal death-rate in the country. There is still ground for much improvement in our practice before we speak of an irreducible minimum in connexion with maternal death.

ANNUAL REPORT OF THE DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY OF THE BELLEVUE HOSPITAL, NEW YORK, 1945–1946

This report covers the period 1st June, 1945, to 31st May, 1946. It consists of 30 large pages of duplicated typescript stapled together. It is on the whole a catalogue of numbers of various presentations, antepartum complications, complications of labour, operations performed and the like in the obstetric portion of the report, followed by a similar long list of numbers of various pathological lesions encountered and operations performed in the gynaecological section. Any attempt at a critical survey of trends or practices in the hospital is completely lacking.

There were 2 maternal deaths among 1,538 deliveries. One of these was attributed to acute bacterial endocarditis, while the patient in the other fatal case showed severe hypertension and had a generalized convulsive seizure during delivery. Single case data are not provided for any obstetrical condition. Yet each maternal death is described at great length—1,200 and 1,300 words respectively. These descriptions are verbose, badly constructed and bristling with hospital slang. They make tedious reading at the end of a rather unimaginative catalogue.

The report shows that a considerable amount of good work is done in the hospital, but it is difficult to imagine that obstetricians from other hospitals will find it either of much interest or instructive.

THE MATERNITY UNIT REPORT; ST. LUKE'S HOSPITAL (SURREY COUNTY COUNCIL), GUILDFORD, FOR THE YEAR 1946

In the short preface the reader is informed that the presentation of a comprehensive annual report for 1946 is made to mark the first post-war year and also to record a most successful year for the Unit. This new venture—that at least is the impression given—is surely a praiseworthy method of celebration.

The number of patients admitted to the Unit was 1,389 (total admissions 1,694) of whom 1,332 were delivered there. There was only 1 maternal death (0.08 per cent). There were 31 stillbirths (2.3 per cent), and infant deaths in the first 10 days numbered 27 (2.05 per cent).

The importance of the early recognition of toxaemia of pregnancy with early hospitalization is emphasized. There were 194 admissions among 138 booked cases in which toxaemia was observed. These patients gave birth to 140 infants of which 5 were stillborn and 2 died—a combined foetal mortality of 5 per cent. Among 20 emergency cases the foetal mortality was 10 per cent. In this hospital all cases which show a blood-pressure above 130/80 mm. Hg are considered to be toxaemic and are advised to go into the hospital for rest and investigation. Of course the lower the standard of hypertension is, the more likely is the foetal result to be satisfactory.

The report has been compiled with care and reflects the high standard of the work done in the Unit. The results achieved must be gratifying to the Staff. Nevertheless, certain modifications might make it of more interest to the reader. The preface of some 120 words might be expanded into a more interesting critical survey of the practice and achievements of the Unit. Certain clinics are held outside the hospital and are said to have been a success. More information might be given about these and about the antenatal hostel provided for patients who live in outlying villages and townships. The definition of what constitutes an "emergency" admission is far from clear. Maternal deaths should always be set out prominently with a paragraph about each one. A considerable search was necessary before the reviewer discovered that the one maternal death had occurred from obstetric shock following

Caesarean section for contracted pelvis in a booked case.

In the paediatric section single case data are given of all infant deaths and stillbirths in addition to a statistical summary. It is interesting to note that of 1,289 infants discharged alive, 1,074 were entirely breast fed on leaving the hospital.

REPORT OF THE PENINSULAR MATERNITY HOSPITAL, CAPE TOWN, FOR THE YEAR 1946

The report, which runs to 38 pages, opens with a critical survey of 15 pages embodying the salient features of work done in the hospital during the year. Three further pages are devoted to details of 5 cases of special interest. Then follows a statistical summary, which is succeeded in turn by tables for transverse lie, breech delivery, destructive operations, forceps delivery, primary uterine inertia, surgical induction of labour, antepartum haemorrhage, eclampsia, indications for Caesarean section, morbidity, maternal mortality, stillbirths and neonatal deaths.

The hospital is overcrowded. Into its 40 beds, 1,901 patients were admitted, and of these 1,663 were delivered in the hospital. Because of shortage of beds it was necessary to refuse admission to some 80 patients, most of whom suffered from some complication of pregnancy, but some were actually in labour. The morbidity rate (B.M.A. standard) was 5.7 per cent, and the overcrowding is considered an attributable factor. As many as 57 patients have been accommodated at one time—that is 42 per cent above capacity.

Certain differences appear between the European and non-European patients. The general incidence of syphilis is high (11.5 per cent), but the incidence among Europeans was 1.7 per cent, while among the non-Europeans it was 14.5 per cent. The Europeans showed a higher incidence of uterine inertia, and pre-eclamptic toxaemia was twice as common in them as in non-Europeans. In spite of the fact that syphilis accounted for 16.1 per cent of the neonatal deaths and that the incidence of prematurity was definitely higher in the non-European section, the incidence of neonatal deaths was slightly higher in the European section.

In reading the tables of individual conditions giving single case data, it will at once be evident that these differ in certain respects from similar tables to those annual reports which follow more closely the form suggested by the sub-committee appointed by the Council of the Section of Obstetrics and Gynaecology of the Royal Society of Medicine (*Proc. Roy. Soc. Med.*, **21**, 1533–1542, 1928). At the head of each table is a short summary which should be read in conjunction with the paragraph referring to that condition, disorder or operation in the critical survey earlier in the report. At first glance one might think that in the single case data every case of the disorder or operation had been tabulated. But this is not so. There were 12 cases of transverse lie: 10 of these are set out in considerable detail, but 2 do not appear in the table. Similarly, there were 14 cases of eclampsia: details of 11 are given. The reason for this selection is not stated. Not all pathological conditions and major operations receive this selective single case treatment, e.g., in the antepartum haemorrhage table details are not given of any single case. The reason for this further element of selection is not indicated.

Where single case data are given they are extensive. Most of the details appear in " notes " or " remarks " at the end of a series of columns giving parity, maturity, etc. Yet in the welter of detail given there are surprising omissions, as will be found in the table of Destructive Operations (page 26). The last case is that of a 2-para (initials S. S.) for whom the 6th August was evidently an important date (presumably either the date of her admission or operation), craniotomy was performed for disproportion, but the patient's age is not given. The case immediately above that in the same table, a 12-para, whose age is also omitted, had a difficult craniotomy performed for maternal distress; but whether or not the foetus had died before the craniotomy was performed is not mentioned.

There were 4 maternal deaths (0.178 per cent). Eclampsia was the primary cause in 2, sepsis following Caesarean section in 1, while the last—a case of postpartum haemorrhage—died 45 minutes after admission in a moribund condition. In the critical survey it is not stated whether the hospital caters for the treatment of emergency postpartum haemorrhage in the patient's own home.

The report is so attractively printed that the reading of it is a pleasure.

REVIEW OF CURRENT LITERATURE

The Journal is fortunate in being able to run this Review in conjunction with the Abstracting Service of the British Medical Association. All the abstracts of this service which cover obstetrical and gynaecological literature and literature on the new-born are at our disposal. The Review will, however, contain in addition abstracts of articles which, though not of sufficient general interest for publication in the monthly volumes published by the British Medical Association, are yet sufficiently important for a specialist journal. It is to be hoped that our readers will collaborate in the preparation of these abstracts. Those who are willing to take part in the service are invited to communicate with the Editor, The Abstracting Service, B.M.A. House, Tavistock Square, London, W.C.1. There is special need of abstracters in foreign languages, and when offering his or her services the writer should indicate the language (apart from English) in which he or she is proficient. The name of the abstracter will be acknowledged in the text and payment will be made at the rate of thirty shillings per thousand words.

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ANATOMY

852. **The Fibrous Nature of the Human Cervix, and its Relation to the Isthmic Segment in Gravid and Nongravid Uteri.**

By D. N. DANFORTH. *Amer. J. Obstet. Gynec.*, **53**, 541–560, Apr. 1947. 11 figs., 14 refs.

Aschoff, in 1905, defined the isthmus uteri in the non-pregnant uterus as the area lying between the histological and the anatomical internal os. The histological internal os marks the transition point from endocervical to isthmic mucosa, while the anatomical internal os 6 to 10 mm. above it is a constriction in the uterine lumen, marking the lower boundary of the corpus uteri. The mucous membrane of the isthmus is similar to that of the corpus but thinner, and richer in supporting tissue, while its glands are sparser and less sensitive to the ovarian hormones, and are said to be glycogen-free. The classical conception of the isthmus in pregnancy is summarized by Danforth as follows: "During the third month the isthmus elongates to about three times its former length, and this elongation is said to be accompanied by proportionate thinning. During the subsequent weeks 'unfolding' occurs, so that the entire isthmus is incorporated into the formation of the ovum chamber; the uterine cavity then consists of cavum corporis plus the widened isthmic canal. The isthmus is now referred to as the lower uterine segment."

Danforth examined pregnant and non-pregnant uteri by Masson's trichrome stain (iron haematoxylin; acid fuchsin; aniline blue) to distinguish smooth muscle from fibrous tissue. His results were as follows. The basic structure of the cervix was found to be fibrous tissue with comparatively little muscle. In many specimens virtually no muscle could be found. In others there was as much as 40 to 45 per cent, but usually it did not exceed 10 or 15 per cent, and was scattered at random throughout the substance of the cervix. It seemed unlikely that the muscle could exert any sphincteric action. The amount of elastic tissue was insignificant, and it was most abundant around the walls of the larger vessels. The tissue above the cervix is composed predominantly of muscle, the transition occurring more or less abruptly at the level of the histological internal os.

During early pregnancy it was found that the length of the cervix does not change appreciably, while the elongation of the isthmus is proportional to that which occurs elsewhere in the muscularis of the uterus. There was no evidence of thinning of the isthmus before unfolding, but it is possible that it takes place later. Unfolding or dilatation of the isthmus occurs down to the region of the fibromuscular junction, and after it has taken place no evidence remains of the anatomical internal os either macroscopically or microscopically. The unfolding of the isthmus seems to coincide with the time when the ovum completely fills the uterine cavity and thus requires more space for its accommodation. Because of these findings it is suggested that the uterus should be regarded as consisting of two parts, cervix and corpus, according to whether the fundamental tissue is chiefly fibrous or chiefly muscular, and that the isthmus uteri be recognized as a part of the corpus just as the fundus is part of the corpus. These observations help us to understand why the cervix is refractory to the stimuli which in the same organ give rise to such tremendous growth and contractile responses, and also the nature of the barrier that retains the products of conception within the uterus until their maturity. A rational explanation is also offered for the limitation of the unfolding of the isthmus at the cervico-isthmic junction.

F. J. Browne

853. **A Study of the Surgical Anatomy of the Vagina, with Special Reference to Vaginal Operations.**

By W. SHAW. *Brit. med. J.*, **1**, 477–482, Apr. 12, 1947. 6 figs., 12 refs.

The surgical anatomy of the vagina is described in detail and new names are suggested for several sulci and folds which are of importance in relation to operative procedures on the vagina. The *parameatal recess* is the term used for the small depression on either side of the urethra. About ¼ in. (0.6 cm.) below the urethral meatus there is a groove, the *submeatal sulcus*, often clearly defined when the anterior vaginal wall is prolapsed; it can be displayed by drawing down the cervix with a volsellum. This groove indicates the posterior margin of the urogenital diaphragm. A second groove, the *transverse sulcus of the anterior vaginal wall*, representing the approximate junction of the urethra with the bladder, can be defined about 1½ in. (3.75 cm.) from the urethral meatus. Further down the anterior vaginal wall there is a third groove, the *bladder sulcus*, denoting the lower limit of the bladder. Between the lateral vaginal and submeatal sulci there is a fold of skin termed the *oblique vaginal fold*; below and lateral to this fold there is a small recess—the *paraurethral recess*.

Methods of demonstrating the fascial layers deep to the vagina are described in detail. Attached to the anterior vaginal wall is a well-defined layer of fascia, the *vaginal fascia*, while a much thinner layer of fibromuscular tissue, the *vesical fascia*, covers the bladder. The *vesico-vaginal space* lies between these two layers of fascia. At the level of the transverse vaginal sulcus these two fascial layers fuse and pass downwards to become attached to the margin of the urogenital diaphragm at the submeatal sulcus. The vesical fascia is continued upwards on to the supravaginal portion of the cervix and is now termed the *vesico-cervical ligament*. The bladder septum which passes from the vesical fascia to the fascia covering the cervix lies on either side of the vesico-cervical ligament. The

chief function of the fused vaginal and vesical fasciae, which pass between the transverse vaginal sulcus and the urogenital diaphragm, is to support the urethra, and the term *post-urethral ligament* is suggested for this fascial band. Its upper cranial margin is usually well defined and gives rise to the transverse vaginal sulcus. The post-urethral ligament is attached laterally to the pubic ramus as far as the junction with the ramus of the ischium, and in the mid-line it is adherent to the bladder for a short distance upwards towards the cervix. As the nomenclature of the fascial tissues of the pelvis is confusing, it is suggested that the term *pelvic fascia* should be restricted to the dense fascial tissues covering the levator ani and obturator internus muscles, while the term *endopelvic fascia* is used for all other fascial layers.

The technique of anterior colporrhaphy based on the identification of the different ligaments and fascial layers is described. It is considered that, between the transverse vaginal and bladder sulci, the only direct supports of the bladder are the vesical and vaginal fasciae along with the anterior vaginal wall. Therefore in order to prevent any recurrence of cystocele it is essential to suture the post-urethral ligament, after mobilization of the bladder, to the front of the uterus at the level of the utero-vesical pouch. Stress incontinence can be overcome by a series of interrupted Lembert sutures through the post-urethral ligament, forming a shelf so that the urethra is stretched and elongated upwards and backwards. An essential feature in the author's operative technique for vaginal hysterectomy, described in detail, is to form a shelf incorporating the post-urethral ligament to support the bladder after the uterus has been removed. The first suture passes through the cut vaginal wall 1½ in. (3.75 cm.) from the urethra, through the post-urethral ligament and the cut edge of the peritoneum near its attachment to the bladder, then through the post-urethral ligament again and the vaginal wall on the other side. The first suture is reinforced by a second through the vaginal wall on one side, the post-urethral ligament, and the tissues at the upper end of the broad ligament (the ovarian ligament, Fallopian tube and round ligament) on either side, then again through the post-urethral ligament and the vaginal wall on the other side, so as to anchor the shelf formed by approximation of the upper portions of the broad ligament to the post-urethral ligament. It is also essential in this operation to remove as much peritoneum as possible from the pouch of Douglas; redundancy of peritoneum can be exposed by traction on the uterus delivered through the utero-vesical pouch. The subsequent development of a hernia of the pouch of Douglas after vaginal hysterectomy can be obviated while carrying out a colpoperineorrhaphy by suture of the utero-sacral ligaments, the rectal septa which represent the downward continuation of the utero-sacral ligaments, and even the two levator ani muscles to the posterior part of the shelf formed by approximation of the posterior portion of the broad ligament. This procedure, however, narrows and shortens the vagina and is not applicable to all cases. If normal coitus is to be resumed the utero-sacral ligaments only are sutured after removal of the peritoneal pouch. The importance of suturing the levator ani muscles at least 2 in. (5 cm.) above the level of the vaginal orifice is emphasized.

To control stress incontinence of urine associated with cystocele and prolapse of the uterus and urethra it is important to suture the post-urethral ligament in such a way that it is stretched in a sagittal direction. This suture may be reinforced by a series of reefing sutures on each side of the urethra. Stress incontinence not associated with prolapse can be controlled by suturing the upper edge of the post-urethral ligament to the front of the cervix or by means of a series of interrupted sutures fixing the post-urethral ligament to the vaginal wall at a higher level than normal.

T. N. MacGregor

854. **Our Study of Vaginal Cytology.** (Nosso estudo sobre a colpocitologia.)

By A. Bittencourt de Oliveira. *Brasil-med.* **61**, 165–167, Apr. 19 and 26, 1947. 5 figs., 4 refs.

PHYSIOLOGY

855. **The Endocrine Function of the Uterus.** (A funçao endócrina do útero.)

By J. Simoes E. Silva. *Rev. Ginec. Obstet.*, **1**, 371–383. Apr. 1947. 27 refs.

856. **Capillary Fragility and Menses in Rheumatic Girls.**

By E. E. Brown and V. P. Wasson. *J. Pediat.* **30**, 455–458, Apr. 1947. 23 refs.

This paper discusses the menstrual cycle and capillary resistance in 28 ambulant rheumatic girls. It is noted first that values for capillary resistance vary with season and age, and that capillary resistance is low in streptococcal infection, measles, and pneumonia; at the same time the menses may be excessive or early in onset. The average age in this group of patients was 13.4 years, and capillary resistance was 17.4 cm. of mercury as compared with 27 cm. in non-rheumatic subjects. The onset of the menstrual cycle tended to be early in the group (11.9 years as contrasted with 13.5 years for American girls); bleeding lasted longer and was more frequent. Capillary resistance was markedly high in autumn as compared with February, March, and April. The work rules out the likelihood of vitamin-C deficiency being the cause of this, and suggests that a more likely cause is variation in streptococcal toxin. Rheumatic fever is common in the autumn, but the peak of both streptococcal and rheumatic activity is reached in the spring.

Beryl Twyman

857. **A Quantitative Determination of the Content of Contractive Substances in Human Sperm and their Significance for the Motility and Vitality of the Spermatozoa.** [In English.]

By J. ASPLUND. *Acta physiol. scand.*, **13**, 103–108, Feb. 1947. 2 figs., 8 refs.

The depressor and plain-muscle-stimulating effects of sperm are attributed to factors such as prostaglandin and choline. The author has attempted to estimate the total amount of these substances in 155 specimens of sperm plasma, using rabbit gut and a standard prostaglandin solution prepared by von Euler's method. The substance or group of substances causing plain-muscle contraction was present in all specimens but the amount varied considerably. Some specimens caused a rapid tetanic increase in tonus unlike the typical prostaglandin curve. This effect persists after atropine and is due to some factor other than prostaglandin or choline. The amount of these substances present is not related to the life and motility of the spermatozoa.

E. F. McCarthy

858. **The Time of Ovulation.**

By J. I. BREWER and H. O. JONES. *Amer. J. Obstet. Gynec.*, **33**, 637–644, Apr. 1947. 4 figs., 13 refs.

The authors have determined the time of ovulation by estimating the age of corpora lutea histologically. They agreed with Corner that reasonably accurate age calculations can be made by this means, though an error of 2 days in calculated age is considered reasonable.

The material was obtained from 100 women in active menstrual life. All had menstrual cycles within the limits established for normal. In most cases some pelvic pathology was present but in no instance had it disturbed the menstrual rhythm. The patients were unselected and no effort was made to operate at any particular time in the cycle. The material consisted of entire or resected portions of one or both ovaries and endometrium. Great care was taken to ensure that menstrual dates were accurately recorded, and, following the usual custom, the first day of bleeding was counted as the first day of the cycle. Operation was carried out on at least 1 woman on each day of the cycle except the third and twenty-seventh days. It was shown that 54 of the 100 patients had ovulated during the cycle studied, and the range of time of ovulation was from the eighth to the nineteenth days. There was a greater tendency to ovulate early than late, for only 1 patient ovulated after the seventeenth day and more ovulated on days 8, 9, 10, and 11 than on days 16, 17, 18, and 19. Of the 54 women who ovulated, 36 did so on days 12, 13, 14, and 15, with the highest peak on the fourteenth day.

Study of the endometrium of 1 woman ovulating early in the cycle showed it to be developed to a degree consistent with the age of the corpus luteum, and the authors suggest that the cycle concerned would have been shorter than the usual 28 days reported by the patient. The woman ovulating on the nineteenth day also gave a history of 28-day cycles, but in fact this cycle was lengthened. One patient with 21- to 37-day cycles was operated upon on the fifteenth day and found to have a 5-day-old corpus luteum. Of the 46 women without evidence of ovulation, 10 were at the thirteenth or fourteenth day of the cycle. All except 1 had mature follicules. The exception was a woman of 48 years of age, neither mature follicle nor recent corpus luteum was found and the endometrium showed little evidence of stimulation. This was the only case in which failure of ovulation was strongly indicated. Four patients who had not ovulated by the eighteenth day had follicles suggestive of imminent ovulation.

The authors correlate their findings with ovulation time studies carried out by other workers by means of endometrial, ovarian, and early embryo histology (Rock and Hertig), study of unfertilized ova (Allen *et al.*), rectal palpation in the rhesus monkey (Hartman), human rectal (Gruelich *et al.*) and oral (Davis) temperature records, observations on cervical mucus (Lamar *et al.*), vaginal smears (Papanicolaou), and pregnandiol urinary excretion (Venning and Browne). The consensus is that ovulation usually takes place in mid-cycle with a range from the eighth to nineteenth day in patients with a 26- to 30-day cycle. In the discussion following this paper, Davis provided proof that the rise in temperature during the second half of the cycle is due to progesterone.

Doreen Daley

859. **The Genito-Pituitary Reflex and Ovulation.** (Le réflex génitohypophysaire et l'ovulation.)

By R. SEGOND. *Presse méd.*, **55**, 359–360, May 31, 1947.

860. **Observations on the Mechanism of Ovulation in the Frog, Hen and Rabbit.**

By S. H. KRAUS. *West J. Surg.*, **55**, 424–437, Aug. 1947. 16 figs., 22 refs.

861. **Electrical Detection of Ovulation.** (La détection éléctrique de l'ovulation.)

By J. VARANGOT, S. VASSEY and M. COLLIARD. *Sem. Hôp. Paris*, **23**, 1350–1356, May 28, 1947. 5 figs., 32 refs.

862. **Functional Uterine Haemorrhages.** (Les hémorragies utérines fonctionnelles.)

By J. L. WODON and R. CORDIER. *Brux. méd.*, **27**, 1333–1342, June 15, 1947. 12 refs.

863. **Skin Manifestations of Menstruation.**

By K. WIENER. *Wisconsin med. J.*, **46**, 694–696, July 1947.

864. **Studies on Endometrial Alkaline Phosphatase during the Human Menstrual Cycle and in the Hormone-treated Monkey.**

By W. B. Atkinson and E. T. Engle. *Endocrinology*, **40**, 327–333, May, 1947. 5 figs., 7 refs.

PREGNANCY

865. **The Problem of Fertilization.**

By Lord Rothschild. *Brit. med. J.*, **2**, 239–242, Aug. 16, 1947. 31 refs.

866. **The Anatomical and Biological Conception of Pregnancy.** (Concepto anátomo-biológico de la gestación.)

By E. Gil Vernet. *An. Med. Cirurg.*, **21**, 361–374, June 1947. 10 figs.

867. **The Effects of Pregnancy and Relaxin on the Histology of the Pubic Symphysis in the Mouse.**

By K. Hall. *J. Endocrinol*, **5**, 174–182, July 1947. 15 figs., 7 refs.

868. **Course of Pregnancy and Parturition in Women Treated for Primary Sterility.** (Sul comportamento della gravidanza e del parto in donne trattate per sterilità primitiva.)

By E. Robecchi. *Minerva Chir.*, **2**, 296–299, Aug. 1947.

869. **A Study of Fetal Movements in Relation to the Mother's Activity.**

By D. B. Harris and E. S. Harris. *Human Biol.*, **18**, 221–237, Dec. 1946. 1 fig., 8 refs.

The authors have studied foetal movements in relation to the mother's activity. They review the literature on the subject and contribute the results of their own investigations. Hicks, in 1880, first devised a pneumatic tambour to record such movements, and various types of pneumatic apparatus have been tried subsequently. Kellog, in 1941, used a mechanical device, consisting of metal abdominal plates and vertical rods, which recorded movements on a kymograph drum. Studies of foetal movement, based upon the mother's own observations, were made by other authors by the same method. Sontag and Richards observed the foetal heart rate at ten-beat intervals.

The object of the present investigation was to decide whether a 30-minute subjective observation would yield a statistically reliable measure of foetal activity; whether there was any relation between fatigue experienced by the mother and the amount of foetal activity; what relation there was, if any, between hour-of-day and day-of-week foetal activity, on the assumption that the hour of day or the day of the week might systematically affect the mother's activity; and what relationship the length of the mother's day and the number of hours she spent in bed had to the amount of foetal activity. All observations were made by the mother herself, who recorded foetal movements of varying degrees with a prearranged series of marks on a piece of paper during 30-minute periods.

It would appear that the mother's recordings of foetal activity furnished an accurate estimate. Movements increased in strength and number most rapidly during the first month of perceived motility, and the foetus was consistently more active at the close of the observer's day; but there was no constancy in the relative number of movements noted during morning or night. The evidence concerning the effect of fatigue on foetal activity is inconclusive.

870. **Maternal and Foetal Relations.** (Relaciones materno fetales.)

By M. Garriga Roca. *An. Med. Cirug.*, **21**, 298–310, May, 1947.

871. **Obstetrics and Cholinergy.** (Obstétrique et Cholinergie.)

By H. Laborit and P. Morand. *Gynéc. Obstét.* **46**, 298–302, 1947. 3 refs.

872. **Placental Metabolism of Vitamin C. I. Normal Placental Content.**

By A. C. Barnes. *Amer. J. Obstet. Gynec.*, **53**, 645–649, Apr. 1947. 12 refs.

Studies of maternal and foetal whole blood showed that the vitamin-C content was consistently higher in the foetal blood. Maternal venous whole-blood levels ranged from 0.29 mg. to 1.8 mg. per 100 ml. Foetal cord blood levels ranged from 1.2 to 2.48 mg. per 100 ml. and were always greater than those in the corresponding maternal blood. Placental levels ranged from 4.7 to 21.0 mg. per 100 g. of tissue with a mean of 9.4. In each of the 84 cases examined the placental level was considerably higher than either of the blood levels involved, ranging from 3 to 10 times the foetal blood content. A possible explanation of this high level in the placenta is that the placenta synthesizes vitamin C. A series of *in vitro* experiments ruled this explanation out. These results tend to support the postulate that the difference between the foetal and maternal blood level arises from a selective retention of ascorbic acid at the placental barrier. Further experiment showed that no such retention and storage occurs of carotene or thiamine.

F. J. Browne

873. **The Amniotic Duct as the Key Structure in the Determination of the Direction of Growth of the Human Placenta and its Orientation in the Uterus.**

By J. Krafka and L. Bowles. *Amer. J. Obstet.* **53**, 561–568, Apr. 1947. 11 figs., 11 refs.

It has been generally held that the placenta grows radially from a fixed centre. Examination of the vascular bed of the placenta has shown, however, that it is bilaterally symmetrical, with the right and left umbilical arteries distributed according to a definite basic pattern consisting of an anterior, lateral, and posterior branch on either side. Right and left sides are recognized by the relation to the umbilical vein, which always lies

anterior to the cross anastomosis between the two arteries. This relation can be demonstrated in the vessels of the 3-mm. embryo at the time when the vascular bed is first established. In the 13-day Torpin ovum the amniotic duct consists of a solid cord of cells in continuity with Langhan's layer of the chorion above, and canalized at its lower end, the lumen opening into the amniotic cavity. It is reminiscent of the strand of cells left along the raphe in those species where the amnion is formed by fusion over the embryonic shield. The amnion is formed by a rearrangement of cells of the embryonic knob around a central cavity. The cells of the knob are in continuity with the chorionic ectoderm at this point, and as these cells are the erosive cells they mark the point of implantation of the ovum in the endometrium. Thus the outer end of the potential amniotic duct underlies the implantation site. In man the allantoic duct makes its appearance at 14 days, and therefore later than the amniotic duct. It extends into the body stalk, and at 21 days reaches as far forwards as the amniotic duct. There is marked undercutting of the body stalk from the chorial plate back to the region of the outer end of the amniotic duct, and this now becomes the outer bed of the potential umbilical cord. This point becomes still further fixed as the vascular bed is established. The authors have been able to identify the cross-anastomosis between the two umbilical arteries in a 3-mm. embryo. This anastomosis fixes the outer end of the body stalk as it becomes the core of the umbilical cord. Hence the placental insertion of the cord marks the normal implantation site.

In most of the grossly bilobate placentas the umbilical cord insertion falls on the line dividing the placenta into two halves. Bilobation is the result of the adaption of the growing villi to the maternal muscular bed, and is not, as has been commonly held, due to extension of growth over the sulci between the anterior and posterior surfaces of the endometrium. From practically any point of implantation, growth of the placenta may be transverse, toward the cervix, or toward the fundus. The most frequent site of implantation is the midline of the fundic zone. Data are given from the Torpin collection consisting of 1,087 specimens. Of these 588 were implanted in the middle of the fundus; 36 were in the right corner and 23 in the left, 5 cervical and 3 cervicolateral.

F. J. Browne

874. **Effect of Pregnancy on the Complement of Guinea Pigs.**

By E. E. Ecker, C. W. Hiatt, and L. M. Barr. *J. Lab. clin. Med.* **32**, 287–291, Mar. 1947. 4 refs.

The complement titre of serum samples drawn from the marginal vein of the ear of pregnant and non-pregnant guinea-pigs has been compared by determining the amount of serum required to produce 50 per cent haemolysis sensitized sheep cells. A photoelectric colorimeter is used, and to 50 per cent point is estimated by interpolation in von Krogh's equation:

$$x_2 = \text{antilog}\left(\log x_1 - \frac{1}{n}\log\frac{Y}{100-Y}\right)$$

where x_2 is the amount of serum producing 50 per cent haemolysis, x_1 is the ml. of serum used in the test, and Y is the percentage of haemolysis obtained. The percentage haemolysis should lie between 10 and 90 for von Krogh's equation to apply.

Pregnant guinea-pigs have substantially lower serum concentrations of complement than non-pregnant guinea-pigs; postpartum the complement concentration rises steadily, till at about 5 weeks after parturition it has reached the normal level.

C. L. Oakley

875. **The Rapid Hyperemia Pregnancy Test in Equids. Its Quantitative Evaluation at Different Time Intervals.**

By B. Zondek and F. Sulman. *Endocrinology*, **40**, 322–326, May, 1947. 7 refs.

876. **Standardized Radiological Pelvimetry. IV. Interpretation of Pelvimetry.**

By E. P. Allen. *Brit. J. Radiol.*, **20**, 205–218, May, 1947. 10 figs., 5 refs.

The purpose of this paper is to attempt to establish some basis for prediction by correlating the course of labour with certain features of the pelvis and by trying to determine which features are the most reliable guides to the course of labour. The report on the course of labour was examined, and the case was classed as either normal or abnormal. Lâbours classed as normal fulfilled the following requirements: (1) The child weighed between 6½ and 8½ lb. (3 to 3.9 kg.). (2) There was no evidence of abnormal moulding of the head. (3) The first stage of labour occupied not more than 20 hours and the second stage not more than 4 hours. (4) An operative procedure when employed was for a condition definitely not related to disproportion.

The abnormal cases were further sub-divided in two ways. In the first place, an attempt was made to assess the level or levels in the pelvis at which disproportion occurred, whether inlet, mid-plane, or outlet. The second sub-division involved "weighting" the abnormal cases by dividing them into the following 3 categories: (1) Cases in which disproportion was minimal; (2) cases in which there was definite disproportion, but in which a normal child could be delivered *per vias naturales*; (3) cases in which delivery *per vias naturales* was impossible. The author admits that this method of dealing with the material may be open to criticism, particularly as he has had to rely for descriptions of labour upon the details provided by the practitioner in charge of each case, and, of course, the standard of obstetrics varied. The correlation between labour and the dimensions

of the pelvis is summarized graphically, the graphs showing variation of the pelvic characteristics against the percentage of weighted abnormal labours.

The author's conclusions are shown in the following table.

Probable mode of delivery	Conjugate in mm.	Brim area in sq. cm.	Mid-plane area in sq. cm.	Bi-spinous in mm.	Posterior sagittal of outlet in mm.
Vaginal delivery certain; without any evidence of disproportion.	Over 130	Over 130	Over 120	Over 110	Over 65
Vaginal delivery reasonably certain, but there may be evidence of minor disproportion requiring forceps.	105–130	105–130	95–120	90–110	50–65
Vaginal delivery uncertain; will show clear evidence of disproportion.	90–105	85–105	80–95	80–90	45–50
Vaginal delivery extremely unlikely. Elective Caesarean section justified.	Under 90	Under 85	Under 80	Under 80	Under 45

L. G. Blair

877. **A Study of Ante-natal Records.**
By J. V. WALKER. *Med. Offr.* **78**, 91–92, Aug. 30, 1947.

878. **Routine Chest Roentgenograms in Pregnancy. A Supplementary Study.**
By H. K. GRAHAM. *West J. Surg. Obstet. Gynec.*, **55**, 438–441, Aug. 1947. 6 refs.

879. **Radiography of the Anencephalic Foetus in Utero.** (Radiographies de foetus anencéphale in utero.)
By P. LANTUÉJOUL and R. LEBOUCHARD. *Gynéc. Obstét.*, **46**, 327–329, 1947. 4 figs.

880. **Placental Radiography with Contrast Substance.** (A questão da radiografia placentária sem meio de contraste.)
By O. LACRETA. *Rev. Ginec. Obstet.*, **1**, 485–490, June 1947. 5 figs., 7 refs.

881. **Nutrition in Pregnancy.**
By E. S. EPPRIGHT. *J. Iowa med. Soc.*, **37**, 237–239, June 1947. 8 refs.

882. **The Diet in Normal Pregnancy.** [Sobre alimentacion en el embarazo normal. (Presentación de una cartilla dietética.)]
By O. AVENDANO and J. SANTA MARIA. *Bol. Soc. Chil. Obstet. Ginec.*, **12**, 21–27, Apr. 1947.

883. **Endocrine Therapy in Obstetrics and Gynecology.**
By H. F. TRAUT. *Cincinnati J. Med.*, **28**, 453–473, July 1947. 22 refs.

884. **The Active Principle of Placental Toxin: Thromboplastin: its Inactivator in Blood; Antithromboplastin.**
By C. L. SCHNEIDER. *Amer. J. Physiol.*, **149**, 123–129, Apr. 1947. 4 figs., 37 refs.

In an attempt to determine the nature of the toxic substance present in placental extracts which has figured largely but unfruitfully in the literature of eclampsia, the author has compared the thromboplastic and toxic properties of placental extracts [apparently human] in the mouse. He finds closely congruent curves for the decline of these two activities on treatment with serum, heat, and acids, and on dilution. His findings, though not perhaps fully conclusive, are strongly suggestive of identity between the thromboplastic and toxic elements—a fact of considerable importance if placental toxin is to be considered as a possible contributory cause of human eclampsia, since heparin gives protection against it. The author briefly discusses the possible interpretations which such a view would give of the pathology of eclampsia. This work, although somewhat dogmatically presented, will be followed with interest.

Alex. Comfort

882. **The Diet in Normal Pregnancy.** [Sobre **Prediction of Hypertension and Toxaemia in** una cartilla dietética.)]
By V. I. KRIEGER and S. WEIDEN. *Med. J. Aust.*, **1**, 417–423, Apr. 5, 1947. 5 figs., 12 refs.

Since Hines and Brown described the cold pressor test in 1932 many attempts have been made to pick out early in pregnancy those women who would, later in pregnancy, develop hypertension and pre-eclamptic toxaemia. The results obtained have been variable but on the whole unsuccessful. The authors of the present paper give the results of a new attack on the problem. In a series of 522 cold pressor tests performed during 200 pregnancies all tests gave normal results in 84 patients; there was hyperreaction to the cold stimulus in one test only in each of 31 patients and in more than one test in each of 85 patients; only 13 (15.3 per cent) of the patients, all of whose pressor tests gave normal results, developed hypertension in the later stages of their pregnancies. Of the patients in whom only one of the tests gave a result of the hyperreactive type 50 per cent developed hypertension and pre-eclamptic toxaemia. When there was mild hyperreaction on more than one occasion 26 of the 85 patients had

a normal pregnancy, but 49 developed hypertensive toxaemia and 10 had pre-eclampsia, a total of 69.4 per cent. The authors therefore claim that while the test is not infallible, it serves as a guide to the obstetrician as to whether the patient will develop toxaemia or not.

[It will be noted that the test is based on the hypothesis that in patients who will later develop hypertension there is a *consitutional* vasomotor instability that makes them hyperreactors to the cold pressor test. It has, however, been shown by the abstracter (*J. Obstet. Gynaec. Brit. Emp.*, 1946, **53**) that in women who later develop pre-eclamptic toxaemia with hypertension there is no constitutional instability, but that the power to hyperreact is acquired at some time during the pregnancy and, so far as could be observed, after the seventeenth week. May not this account for some of the discrepancies, such as changes in reactivity during the same pregnancy, observed by the authors?]

F. J. Browne

886. **The Eclampsia Problem in the Light of Recent Medical Research.** (Eklampsiproblemet i moderne Belysning.)

By E. MOLLER-CHRISTENSEN. *Ugeskr. Læg.*, **109**, 427–434, Aug. 21, 1947. Bibliography.

887. **Pernicious Vomiting in Pregnancy.**

By I. LEWINSKI. *Acta. med. orient.*, **6**, 234–236, July 1947.

888. **Eclampsia Puerperarum and Fractura Columnae.**

By P. M. KJELLAND. *Acta. obstet. gynec. scand.*, **27**, 297–300, 1947. 1 fig., 4 refs.

890. **Eclampsia with Haemorrhage of the Brain.** (Eklampsie mit Hirnblutung.)

By J. FROEWIS. *Wien klin. Wschr.*, **59**, 433–435, July 4, 1947. 1 fig., 3 refs.

891. **Results Obtained by the Treatment of Eclampsia in Pregnancy with Intravenous Sodium Pentothal Injections and Oxygen Inhalations.** (Resultados obtenidos en el tratamiento del sindrome eclamptico en el embarazo, por medio de las inyecciones intravenosas de pentothal sodico e inhalaciones de oxigeno.)

By G. AUBANEL. *Medicina, Méx.*, **27**, 250–252, June 10, 1947.

892. **Nephropathies and Pregnancy.** (Néphropathies et grossesse.)

By J. F. PORGE. *Presse méd.*, **55**, 325–327, May 17, 1947.

893. **Chorioangioma of the Placenta Associated with Low Implantation and Premature Separation.**

By D. B. ROTH. *Amer. J. Obstet. Gynec.*, **54**, 137–139, July 1947. 1 fig., 3 refs.

894. **Placenta Praevia Problem.**

By B. L. KAPUR. *J. Obstet. Gynaec. Lahore*, **8**, 54–58, May 1947.

895. **Marginal Placenta Previa Treated by Artificial Rupture of the Membranes Thirty-nine Days before Vaginal Delivery.**

By R. S. MILLEN. *Amer. J. Obstet. Gynec.*, **53**, 885, May 1947.

896. **Some Aspects of the Abortion Problem.** (Några synpunkter på abortproblemet.)

By P. WETTERDAL. *Nord. Med.*, **34**, 1221–1226, May 23, 1947. 11 refs.

897. **Indications for Therapeutic Abortions.**

By Maternal Welfare Committee of the Medical Society for the State of North Carolina. *North Carolina Med. J.*, **8**, 367–370, June 1947. 1 fig.

898. **The Treatment of Threatened Spontaneous Abortion.** (Synpunkter på behandlingen av den hotande spontana aborten.)

By P. WETTERDAL. *Nord. Med.* **35**, 1575–1577, July 25, 1947. 31 refs.

899. **Oral Therapy in the Management of Threatened Abortion.**

By W. M. SILBERNAGEL. *Ohio St. med. J.*, **43**, 739–740, July 1947. 15 refs.

900. **Treatment of Infected Cases of Abortion.** (Die Behandlung der infizierten Fehlgeburt.)

By T. HEYNEMANN. *Dtsch. med. Wschr.*, **72**, 273–276, June 6, 1947.

901. **Management of Postabortal Peritonitis.**

By H. C. FALK and G. BLINICK. *Amer. J. Obstet. Gynec.*, **54**, 314–320, Aug. 1947. 12 refs.

902. **On What Elements from Curettage Performed for Incomplete Abortion should a Histological Diagnosis be Based?** (Quels sont dans les curetages faits pour " restes d'avortement " les éléments sur lesquels doit se baser le diagnostic histologique de grossesse?)

By R. KELLER. *Gynécologie*, **44**, 97–120, May–June 1947. 15 figs.

903. **Spontaneous Rupture of the Uterus.**

By J. T. ELLIS, S. W. WINDHAM, T. K. MCFATTER, and S. G. LATIOLAIS. *Sth. Surg.*, **13**, 270–279, Apr. 1947. 4 figs., 25 refs.

Two cases of spontaneous rupture of the uterus are recorded, the first in a woman, aged 29, with a history of 3 months' amenorrhoea but no previous pregnancy. She was admitted to hospital on account of intermittent abdominal pains of 8 weeks' duration, associated with vomiting at the onset. Five weeks before admission 1 gallon (4.5 l.) of thin fluid discharged from a rupture in the abdominal wall just below the umbilicus. Two weeks later the discharge became faeculent and

normal bowel movement ceased. Three days before admission a foetal arm was extruded from the site of rupture. On examination she was found to be extremely emaciated and dehydrated. The abdomen was covered with apparently faecal material arising from two sinuses below the umbilicus, and a macerated foetal arm protruded from a third sinus. There was generalized abdominal rigidity and tenderness. Vaginal examination showed a "frozen pelvis". Investigation revealed a positive Kahn reaction and a haemoglobin of 22 per cent. Gaseous distension and the bones of a dead foetus were seen in radiograph.

Two and a half litres of whole blood and large quantities of glucose-saline were given intravenously, and by this means the haemoglobin level was raised to 70 per cent in 3 days. Thirteen days after admission, incision through a gangrenous abdominal wall revealed a foetus partly extruded from the uterus, which was filled by a dark-red foul exudate. The anterior portion of the fundus had sloughed away, as had the lower uterine segment and peritoneum, so that the pelvic brim was exposed. After removal of the foetus, exudate was aspirated and the pelvis drained. In spite of intravenous fluids, the patient died 4 weeks later from sepsis, avitaminosis, and malnutrition. No necropsy was performed.

In the second case, a 37-year-old 4-gravida was admitted to hospital at term complaining of cramp-like abdominal pains, which had been felt frequently during the antenatal period but had been more severe for the previous 12 hours. She was a healthy woman in good condition but with considerable abdominal distension. Foetal parts were readily palpated, but the manner of presentation could not be assessed. The foetal heart-sounds were audible. Pelvic findings were normal, but no presenting part could be identified. Radiography showed a full-time foetus lying transversely below the diaphragm. Ovarian tumour or extra-uterine pregnancy was suspected and pituitrin was given. When no improvement in contractions resulted, Caesarean section was advised. There were 5 litres of greenish fluid and a large foetus free in the peritoneal cavity. The placenta was attached to the ruptured fundus of the uterus, and peritonitis was present. Uterus and appendages were removed. The patient died shortly after operation, but the infant survived.

The authors discuss the aetiology of ruptured uterus and review some of the literature. The incidence found at various obstetric centres varies from 1 in 95 to 1 in 4,000 deliveries. Classical Caesarean section, myomectomy, too energetic curettage, and pelvic infection are regarded as important predisposing causes. Rupture in pregnancy is more often fundal, whereas in labour the lower segment is more commonly involved. It occurs more often in multiparae than in primigravidae. Caution is needed in differentiating between uterine inertia and ruptured uterus with cessation of labour, lest oxytocics be prescribed in the latter condition. Laparotomy, preceded if necessary by blood transfusion, is the treatment of choice, and if infection is present surgery should be radical. Maternal mortality ranges from 50 to 100 per cent, and foetal mortality is said to be 90 per cent.

Doreen Daley

904. **Concealed Rupture of the Uterus.**
By M. E. GARDNER. *Ohio St. med. J.* **43**, 841–842, Aug. 1947. 3 refs.

905. **Uterine Rupture.**
By I. DONALD. *Proc. R. Soc. Med.*, **40**, 379–380, May 1947.

906. **Rupture of the Uterus.**
By J. S. TAYLOR. *Penn. med. J.*, **50**, 801–807, May 1947. 2 refs.

907. **Rupture of the Uterus. A Case Report with Review of Literature.**
By C. A. JAMES. and C. H. LIGON. *Delaware St. med. J.*, **19**, 120–121, June 1947. 14 refs.

908. **Rupture of the Uterus Following Cesarean Section.**
By M. S. MUSA. *J. Palestine Arab med. Ass.* **2**, 98–99, May 1947. 3 refs.

909. **The Management of Ovarian Tumors Complicating Pregnancy.**
By H. C. FALK. and I. A. BUNKIN. *Amer. J. Obstet. Gynec.*, **54**, 82–87, July 1947. 16 refs.

910. **Notes on a Case of Cancer of the Cervix Uteri and Pregnancy.** (Sobre un caso de cancer de cuello úterino y gestación.)
By B. BLANCO. *Toko-ginec. práct.*, **6**, 161–173, May 1947.

911. **Degenerating Tumors Complicating Pregnancy. Myomectomy in the Prenatal Period.**
By E. F. ANDERSON. *West. J. Surg.*, **55**, 273–277, May 1947. 18 refs.

912. **The Significance of Decidual Polyps in Otherwise Normal Pregnancies.**
By R. L. HASS. *Amer. J. Obstet. Gynec.*, **54**, 124–126, July 1947. 4 refs.

913. **Hemoperitoneum from Rupture of the Corpus Luteum. Report of a Case of Ruptured Corpus Luteum of Pregnancy.**
By J. PECMAN. *Pennsylvania med. J.*, **50**, 1161–1163, 1947. 6 refs.

914. **Torsion of the Full Term Pregnant Uterus.**
By F. R. STANSFIELD. *Clin. J.*, **76**, 183–184, Sept.-Oct. 1947. 3 refs.

915. **Pregnancy and the Double Uterus.**
By T. D. TYSON. *Amer. J. Obstet. Gynec.*, **53**, 869–872, May 1947. 3 refs.

916. **A Case of Uterus Duplex with Simultaneous Pregnancy in Both Uterine Cavities.** (Fall av uterus duplex med samtidig graviditet i båda uterinhålorna.)

By L. G. HALLÉN. *Nord. Med.*, **34**, 1069–1070, May 2, 1947.

917. **Peptic Ulcer with Hemorrhage during Pregnancy and Fetal Death.**

By E. B. LE WINN. *Amer. J. Obstet. Gynec.*, **54**, 114–118, July 1947. 8 refs.

918. **The Obstetric Managment of Pregnancy Complicated by Heart Disease.**

By D. N. HENDERSON. *Amer. J. Obstet. Gynec.*, **53**, 494–499, Mar. 1947. 2 refs.

This paper reports an analysis of 200 consecutive cases of pregnancy complicated by heart disease occurring at Toronto General Hospital since 1938. Thirty patients were treated by the induction of abortion; of these 20 had had 2 or more living children and only 2 were primiparae. Indications for induction of abortion were cardiac failure during pregnancy, previous marked impairment of exercise tolerance, or severe myocarditis. These patients were sterilized at the time of operation where practicable. One patient died from cardiac failure 30 days after termination of pregnancy. Among the 170 remaining patients 40 went into premature labour, 4 after induction. Of the patients who went to term, 22 were delivered by Caesarean section, but this method has been largely given up in the last 13 years. The general management of cardiac patients consisted of rest during pregnancy and administration of sedatives during labour, with forceps delivery if the second stage of labour was likely to be prolonged. There were 8 deaths in the 200 cases. Four of the deaths occurred in patients admitted in emergency; there were 21 emergencies in all, so that the corrected mortality for booked cases was 2.2 per cent. The average age at death was 38.8 years, which is one year higher than the average age of 56 female patients shown at necropsy to have died from rheumatic heart disease not associated with pregnancy.

D. M. Stern

919. **The Cardiac in Pregnancy.**

By F. R. HOOD. *Oklahoma J. med. Ass.*, **40**, 181–184, May 1947.

920. **Report from Cardiac Clinic of the Boston Lying-in Hospital for the First Twenty-five Years.**

By B. E. HAMILTON. *Amer. Heart J.*, **33**, 663–668, May 1947.

921. **Pregnancy Complicated by Coarctation of the Aorta.**

By E. R. NOVAK. *Amer. J. Obstet. Gynec.*, **53**, 1054–1056, June 1947. 6 refs.

922. **Subacute Bacterial Endocarditis During Pregnancy.**

By M. E. DAVIS and R. F. WORTMANN. *Amer. J. Obstet Gynec.*, **53**, 878–880, May 1947. 1 fig.

923. **Hypoprothrombinaemia and Cerebral Injury in a Newborn Infant after Dicoumarol Treatment of the Mother.** (Hypoprotrombinemi och hjärnskada hos barn till dikumarinbehandlad mader.)

By G. V. SYDOW. *Nord. Med.*, **34**, 1171–1172, May 16, 1947 1 fig., 3 refs.

A woman aged 44 was given dicoumarol for 1 month before delivery on account of a thrombus in the left leg. Her prothrombin index fell during treatment until it reached 33 on the day of delivery and 16 two days later. It was quickly restored to normal by administration of vitamin K, and there was no excessive haemorrhage during delivery. Examination of the child some hours after birth revealed that there had been extensive subcutaneous haemorrhages over the forehead and scalp; small petechiae were also found in the palate and pharynx. The prothrombin index was found to be extremely low (below 10) and the Hb value comparatively so (94 per cent). Despite intensive treatment with vitamin K, the prothrombin index remained low for 6 days, after which it suddenly returned to normal. The general condition of the child was satisfactory, but it was noticed that when the mother and child were discharged 3 weeks after the birth the child's skull was strikingly large. Subsequent examination showed that the maximum diameter of the skull had increased by the seventh week from 36 cm. at birth to 41.5 cm. Neurological examination showed that there was free communication between the ventricles and the subarachnoid space. At 5 months the maximum diameter was 53 cm. The author points out that hyperprothrombinaemic mothers give birth to children whose prothrombin indices are above the normal, and suggests that when the converse occurs the condition of the child is also a direct consequence of the condition of the mother. In the present case the low prothrombin indices of both mother and child were due to the dicoumarol treatment, and the hydrocephalus was presumably the result of intracranial haemorrhage corresponding to the subcutaneous haemorrhage observed on the scalp. The writer warns against the administration of dicoumarol to pregnant women.

B. Nordin

924. **Anaemic Syndrome with Erythraemic Characters Arising in Pregnancy.** (Sindrome anemica ad impronta eritremica insorta in gravidanza.)

By U. BRACALE. *Arch. Ostet. Ginec.*, **52**, 234–247, July–Aug. 1947. 4 figs., 7 refs.

925. **Purpura Thrombopenica in Pregnacy.** (Purpura thrombopenica—graviditas.)

By P. GUNDERSEN. *Nord. Med.*, **35**, 1829–1831, Sept. 5, 1947. 9 refs.

926. **Brain Tumour in Pregnancy.** (Tumor cerebral e gravidez.)

By D. G. COSTA. *An. brasil. Ginec.*, **12**, 108–118, Feb. 1947. 9 figs., 5 refs.

927. **Adenoma of the Islets of Langerhans in Pregnancy.** (Adenoom van de eilandjes van Langerhans en zwangerschap.)

By A. W. M. POMPEN, C. A. L. JANSEN, and J. DHONT. *Ned. Tijdschr. Geneesk.*, **90**, 1791–1795, Nov. 30, 1946. 2 figs., 16 refs.

A peasant woman, aged 34, 13 days after her second confinement, had sudden attacks of unconsciousness with sweats and increased salivation. Within minutes she began to improve spontaneously, but when consciousness returned she could not speak for a while, her arms felt tired, and she had diplopia, hazy vision, and a queer sensation in the occiput. Between attacks she was normal. Her past history also was normal. The attacks, recognized as hypoglycaemic, ceased after administration of 20 per cent glucose intravenously. During the attacks the blood sugar was 0.05 to 0.06 per cent; her blood pressure was 150/110 mm.; and her ankle jerks were increased. The sella turcica was normal. Urine and erythrocyte sedimentation rate were both normal. The blood calcium content was 11 mg. per 100 ml. After the administration of 50 g. of glucose by mouth the blood sugar was 0.221 per cent after 1½ hours, and 0.143 per cent after 2½ hours. After ceasing breast feeding, 71 days after delivery, there were no more severe attacks. A month later attacks started again, and the patient took large quantities of sugar as a preventative. When she again became pregnant she felt much better. She gave birth to another healthy baby about 17 months after the second. Nine days later the attacks started once more, recurring daily. She lost consciousness for 6 to 12 hours or had severe headaches and dizziness with vomiting, screaming fits, and complete confusion, while her speech became indistinct. Later a left hemiparesis occurred. All these symptoms could be prevented only by giving her 100 to 150 g. of sugar a day. Her blood sugar was now 0.02 to 0.07 per cent. She was operated upon 69 days after her confinement, as an adenoma of the pancreas was suspected. In the head of the pancreas a tumour the size of a hazel nut was removed; there was an immediate rise in the blood sugar. On microscopical examination the tumour proved to be an adenoma of the islets. Several complications prolonged recovery, which took 67 days. The fasting blood sugar now became 0.103 to 0.128 per cent.

The interesting fact in the case is that she had two normal pregnancies during which she felt well, while shortly after the confinements deterioration set in. As the 24-hour blood-sugar curves show, there were, after the first pregnancy, great fluctuations between hyper- and hypoglycaemia, whereas after the second pregnancy the entire curve remained very low. In similar cases of islet adenoma the symptoms have also disappeared with pregnancy, only to return after confinement. Investigations by Young supply a possible explanation. He found that a " glycotrophic factor " or " anti-insulin " is present in the anterior pituitary which, without influencing the blood-sugar curve, decreases or suppresses the effect of insulin on the blood sugar and on glycogen fixation in the muscles. If the greater activity of the pituitary during pregnancy also extends to a greater production of this substance the phenomenon is explainable. *B. Baneth*

928. **Effect of Thiouracil Compounds on the Baby.** (Om Virkningen af Tiouracilforbindelser paa Fosteret.)

By E. FREIESLEBEN and K. KJERULF-JENSEN, *Nord. Med.* **32**, 2811–2812, Dec. 6, 1946. 8 refs.

The authors refer to the literature on the effect on the mother and child of thiouracil given in pregnancy, and add details of a case of their own in which pregnancy had to be terminated in the fifth month. The foetal thyroid was found to be much larger than normal and hyperplastic. The greater part of the paper, however, is devoted to their experiments on rats. Pregnant rats were fed on a standard diet with relatively large amounts of propylthiouracil for some days, after which the foetuses were removed, dried, pulverized, and then fed to normal rats. The thyroids of these animals showed typical hyperplasia; this is taken as proof that thiouracil can pass across the placental membrane. Next, methylthiouracil was given to pregnant rats in doses comparable with those used in man (0.25 mg. in 10 g. of food) and this dosage was continued from conception to delivery. The mothers developed goitres, but the newborn rats showed only a transient thyroid hyperplasia. When the thiouracil dosage was continued during lactation, however, the newborn rats showed marked hyperplasia, which disappeared in a month after stopping the mother's thiouracil, but their further development was slightly retarded permanently. If the growing rats were given the drug in their own food as well (when weaned) they developed a typical cretinism. This could be prevented by giving thyroid hormone; the drug was thus acting through the thyroid and not directly. These results confirm and extend the observations of Hughes (*Endocrinology*, 1944, **34**, 39).

As regards the human mother and child, the authors consider, in view of these findings, that as the thyroid hormone and the thyrotrophic hormone can probably both pass through the placental membrane there is little danger to the child of a woman given thiouracil during pregnancy, provided that the basal metabolic rate is not below normal. The drug should not be given while the mother is feeding the baby.

A. M. M. Wilson

929. **Pregnancy Complicating Diabetes.**

By P. WHITE. *Pennsylvania med J.* **50**, 705–708, Apr. 1947.

This well-known American authority on diabetes in pregnancy reviews the results of pregnancy in 300 consecutive cases seen between 1936 and 1946 in which the gestation lasted at least 24 weeks. There were 51 foetal deaths; 1 maternal death occurred from infective hepatitis. The abnormalities found when pregnancy complicates diabetes are classified as: (1) *Maternal*: (*a*) vascular disease, present in 70 per cent of patients who have survived 20 years of diabetes, and (*b*) hypo-ovarianism. (2) *Obstetric*. These include irritable uterus (in 1 per cent the membranes ruptured long before labour began), early spontaneous abortion (25 per cent), pre-eclampsia (40 per cent; where it was abnormal (58), only 47 per There are low renal threshold for glucose, disturbance of water balance (oedema, hydramnios), and imbalance of sex hormones. (4) *Foetal*. Physically, large size of the foetus is common, as are defects, jaundice, and atelectasis. Chemically, an unstable blood sugar is found. Pathologically, a syndrome resembling erythroblastosis without anaemia in an Rh-positive mother occurs. (5) *Placental Defects*. These include too large and too small an organ.

The most important of these factors is the sex-hormone imbalance. Where this balance was normal (66 cases), 99 per cent of the foetuses survived and the incidence of pre-eclampsia was 2 per cent; where it was abnormal (58), only 47 per cent of the foetuses survived and the pre-eclampsia incidence was 50 per cent. Hence the need for supplying the missing hormones, oestrogen and progesterone. When this was done in 174 cases the foetal survival rate rose to 90 per cent and the incidence of pre-eclampsia fell to 5 per cent.

The rules for management of the diabetic obstetric patient include induction of premature labour at the end of the thirty-seventh or beginning of the thirty-eighth week (Caesarean section was performed on two-thirds of this series), minimal medication, and the use during labour (or pre-operatively and postoperatively) of 1,000 ml. of 5 per cent glucose solution. Salt and sodium bicarbonate are restricted during pregnancy, and ammonium chloride (1 to 2 drachms: 4 to 8 g.) is given daily if oedema occurs.

Stilboestrol and " proluton " (progesterone) are administered during pregnancy by daily intramuscular injection of 5 mg. of each up to the twentieth week; 10 mg. from the twentieth to the twenty-fourth; 15 mg. from the twenty-fourth to the twenty-eighth; 20 mg. from the twenty-eighth to the thirty-second; 25 mg. from the thirty-second to the thirty-sixth; and 30 mg. from the thirty-sixth until delivery. Thyroid and vitamin E are also given.

S. S. B. Gilder

930. **Diabetes and Pregnancy.** (Diabetes en zwangerschap.)

By B. S. Ten Berge and J. J. Van Assen. *Ned. Tijdschr. Geneesk.*, **91**, 1229–1233, May 17, 1947. 7 refs.

931. **Diabetes Insipidus in Pregnancy: Report of a Case with Disordered Action of Uterine Muscle.**

By M. Lake. *Med. J. Aust.*, **2**, 206–209, Aug. 16, 1947. 3 figs., 10 refs.

932. **Effects of Diabetes Mellitus on Foetus.**

By H. Bahry. *J. Obstet. Gynaec. Lahore*, **8**, 51–53, May 1947.

933. **Rapid Treatment of Prenatal Syphilis.**

By S. Olansky and R. Beck. *Amer. J. Syph.*, **31**, 51–56, Jan. 1947. 2 refs.

Although congenital syphilis can be prevented, thousands of infected infants are born in the United States each year. The authors conclude that many syphilitic women do not receive adequate treatment during pregnancy, and believe this failure to be due to the fact that standard methods of anti-syphilitic treatment take too long and are too difficult for the average patient. [In Britain congenital syphilis usually follows failure to diagnose maternal syphilis; the known syphilitic mother is usually co-operative, and attends well for treatment throughout her pregnancy.] The authors have therefore studied intensive-treatment methods in an attempt to prevent prenatal syphilis, and here report the results in 147 patients, of whom 129 were studied for 3 months or longer after confinement. In this series there were 128 live births, 5 abortions, and 6 stillbirths. The 128 live infants were free from clinical signs of syphilis, and only 1 had persistently positive serological evidence. In 2 cases of stillbirth, the foetus showed no pathological evidence of syphilis, and in another 2 cases it was considered that the foetus, which was macerated at birth, had died before treatment was started. One of the abortions was considered to be traumatic in origin, and in another the foetus was thought to be dead before treatment was started.

The treatment schedules used were: (1) 1,200 mg. " mapharsen " by slow intravenous drip over 5 or 8 days combined with 0.2 g. bismuth subsalicylate weekly for 8 weeks; (2) 60 injections of 40,000 units of penicillin at 3-hourly intervals; (3) (*a*) 1 mg. mapharsen per kilo body weight (maximum of 60 mg. per dose) daily for 8 injections, 10,000 units of penicillin every 3 hours for 60 injections, and 0.2 g. bismuth subsalicylate on the first, fifth and ninth days; (3) (*b*) injections of mapharsen on the first, third, fifth, seventh and ninth days, 16,667 units of penicillin intramuscularly every 3 hours for 72 injections, and 3 injections of 0.2 g. bismuth subsalicylate. The stage of syphilis and point in pregnancy at which treatment was started and the outcome of the pregnancies are reported in detail. The findings justify the authors' conclusion that intensive antisyphilitic treatment even late in pregnancy results in a high proportion of non-syphilitic infants.

S. M. Laird

934. **Syphilis in Pregnancy Treated by Penicillin.**
By C. H. INGRAM. *Amer. J. Obstet. Gynec.*, **53**, 881–882, May 1947. 4 refs.

935. **Serodiagnostic Syphilis Control of Pregnant Women.** (Serodiagnostisk syfiliskontroll av gravide kvinner.)
By T. M. VOGELSANG. *Tidsskr. norske lægeforen.*, **67**, 226–228, May 1, 1947.

936. **Acute Poliomyelitis in Pregnancy. Report of Thirty Cases.**
By M. E. BAKER. and I. G. BAKER. *Minnesota Med.*, **30**, 729–734 and 758, July 1947. 17 refs.

937. **Premature Delivery and Stillbirth in Malarial Patients.**
By M. L. RENIGER-ARESHEVA. *Akush. Gynek.*, **1**, 20–25, 1947. 2 figs. [In Russian.]

Of 248 expectant mothers suffering from malaria 100 (40.3 per cent) had a miscarriage and 37 (15 per cent) had a premature labour; thus 55.3 per cent of pregnancies in malarial mothers did not reach term. The usual time at which the pregnancy terminated spontaneously was between the fifth and seventh months. Two lines of research have been particularly followed: (1) an investigation into the histology of the placenta in malarial patients; (2) estimation of the vitamin-C content of the various organs of the foetus. The placental villi showed accumulations of malarial pigment in the portions of the stroma from which the syncytium was absent; there were also proliferation of the syncytium with deposition of malarial pigment, hyaline degeneration of the villi, calcification of the vessels, and numerous cells full of malarial pigment lying free in the intervillous space. Vitamin C was either absent or very deficient in the foetal part of the placenta and in all the foetal organs in the cases examined. Altogether 29,636 deliveries took place in the area in 25 years (1920–1944); of these 2,213 (7.5 per cent) resulted in premature deliveries; 996 (45 per cent) of these patients suffered from malaria. In a series of 40 full-time deliveries of mothers with active malaria there were 3 stillbirths (7.5 per cent); of the remaining 37 infants only 15 (37.5 per cent) survived the neonatal period. The author concludes that a malarial mother has less chance of producing a viable full-time foetus than a non-viable one. It is emphasized that malaria must be treated especially energetically during pregnancy.

Nicolas Tereshchenko

938. **Tuberculosis and Pregnancy. A Clinical and Statistical Study of 123 Cases.** (Tuberculose et grossesse. Etude clinique et statistique de 123 cas.)
By J. A. MILLET and J. L. PILLON. *Un. méd. Can.*, **76**, 815–818, July 1947. 19 refs.

939. **Renal Tuberculosis and Pregnancy.** (Tuberculose rénale et grossesse.)
By — BOUZOM. *J. Méd. Bordeaux*, **124**, 350–353, Aug. 1947.

940. **Some Remarks on Pyelitis and Pyelonephritis in Pregnancy and their Treatment.** (Quelques remarques à propos des pyélites et pyélonéphrites gravidiques et de leur traitement.)
By E. LARTIGAUD. *Rev. franc. Gynéc.*, **42**, 218–224, June 1947. 8 refs.

941. **Possiblity of Extrauterine Pregnancy in Ovarian Endometriosis.** (Possibilita di gravidenza extrauterina nelle endometriosi ovariche.)
By A. NORDIO. *Arch. Ostet. Ginec.*, **51**, 357–365, Nov.–Dec. 1946. 6 figs., 19 refs.

The possibility of implantation of a fertilized ovum on an ovary the site of endometriosis has been discussed by several authors. Primary ovarian pregnancy is a relatively rare occurrence and is usually due to intrafollicular nidation of the fertilized ovum. In such a case the corpus luteum is found in the same ovary as the pregnancy.

The author describes the case of a woman of 25 in whom menstruation was previously regular. When the last period was 5 to 6 days overdue she experienced haemorrhage and pain. A diagnosis of metropathia haemorrhagica was made. At laparotomy the uterus was found to be enlarged and the right ovary to contain a typical corpus luteum of pregnancy. The left Fallopian tube was normal, but the left ovary contained a small blood cyst. The left ovary and the uterine fundus were removed. The uterine muscle showed no sign of adenomyosis. The left ovary showed a diffuse decidual reaction. Numerous chorionic villi were found in the ovary and also typical endometrial glands with decidual reaction.

The author points out that the possibility of implantation of a fertilized ovum in an ovary the site of endometriosis has rarely been confirmed. The presence of the corpus luteum in the opposite ovary confirms this possibility. This case record represents a new contribution to the study of migration of the fertilized ovum. The diffuse decidual reaction in the ovary is of particular diagnostic value. Difficulty arose in the author's case because no trace of the embryo could be found, because interruption of the pregnancy occurred before the patient had noticed any abnormality, because of the absence of amenorrhoea, and because of the incongruous association of a small cyst with well-developed chorionic villi.

[This is a very interesting case record. The association of pregnancy and endometriosis is an uncommon one. It is generally held that the sterility in these cases is due to the disturbance of ovarian function associated with extensive deposition of endometrial tissues. The occurrence of ovarian pregnancy in deposits of endometriosis is certainly a possibility, and it is perhaps remarkable that it does not occur more often, especially in cases where the leison is early and superficially situated.]

Josephine Barnes

942. **Ectopic Pregnancy. An Analysis of 67 Consecutive Cases.**
By M. J. THORNTON. *Wisconsin Med.*, **46**, 691–693, July 1947. 6 refs.

943. **Decidua Formation in Ectopic Pregnancy.** (Decidua vorming bij ectopische zwangerschap.)
By P. BRUSSELMANS. *Belge. Tijdschr. Geneesk.*, **3**, 487–490, June 1947. 9 refs.

944. **Simultaneous Intrauterine and Extrauterine Pregnancy.**
By C. POWELL and R. H. GOTTSCHALK. *Amer. J. Obstet. Gynec.*, **54**, 132–134, July 1947. 5 refs.

945. **Statistical Observations on Extrauterine Pregnancy in Saturnino Lora Hospital, 1943-46.** (Observaciones estadisticas sobre el embarazo extrauterino en el Hospital S. Lora durante los años 1943-46.)
By R. G. ESTRADA LERROUX. *Rev. méd.-quirúrg. Oriente*, **8**, 75–79, June 1947.

946. **Full-Term Intraligamentary Pregnancy.**
By I. T. FRASER. *Proc. R. Soc. Med.*, **40**, 378–379, May 1947. 2 refs.

947. **Tubal and Uterine Twin Pregnancy.**
By M. O. BELSON. *Amer. J. Obstet. Gynec.*, **53**, 883–884, May 1947.

948. **Early Tubal Pregnancy.**
By R. K. DEWAR. *Canad. med. Ass. J.*, **57**, 288–289, Sept. 1947.

949. **Recurrent Tubal Pregnancy.**
By A. F. LEE. *Northw. Med., Seattle*, **46**, 535–536, July 1947. 7 refs.

950. **A Rare Ectopic Pregnancy in the Left Cornu of the Uterus.** [In English.]
By A. WIST. *Ann chir. gynaec. fenn.*, **36**, 129–141, 1947. 9 figs., 44 refs.

951. **Primary Ovarian Pregnancy.**
By N. P. ISBELL and W. B. BACON. *Amer. J. Obstet. Gynec.*, **45**, 329–335, Aug. 1947. 4 figs., 31 refs.

952. **Abdominal Pregnancy.**
By L. H. DOUNGLASS and S. G. KOHN. *West Virginia med. J.*, **43**, 307–310, Sept. 1947. 4 figs.

LABOUR

953. **Delayed Ligation of the Umbilical Cord.**
By G. N. BALLENTINE. *Pennsylvania med. J.*, **50**, 726–728, Apr. 1947. 5 refs.

Immediate ligation of the cord on delivery of the infant has been shown to lead to a lowering of the erythrocyte count and haemoglobin value in the first week of life as well as to an iron deficiency later. The practice may also contribute to the hypoprothrombinaemia of the newborn.

In a series of 135 deliveries (vertex presentations) studies were made of the amount of blood obtained by the infant as a result of delaying ligation of the cord. All but one patient were delivered spontaneously or by low forceps, and all received an intravenous injection of "ergotrate" when the anterior shoulder was delivered, so that delivery of the placenta was prompt. Thirty infants were delivered directly on to scales; the cord was at once ligated and cut, and the infant weighed. It was again weighed 30 to 40 minutes later. The change in weight was negligible. A second group of 30 infants were delivered on to scales and weighed. The cord was not ligated, and the baby and placenta were transferred to a cradle. After the cord had stopped pulsating it was ligated and cut, and the infant was again weighed. The average gain in blood volume (calculated from the specific gravity of blood and the gain in weight) was 96 ml., with extremes of 37 and 187 ml. There was no relation between the weight of the baby, the length of the cord, and the length of time elapsing before the cord ceased to pulsate (average 21.7 minutes). Elevation of the placenta during the immediate postnatal period did not result in increased gain in weight. In a group of 5 infants 55 per cent of the blood gained after birth flowed into the infant in the first minute and 84 per cent in the first 5 minutes.

In a group of 20 infants the cord was found to contain an average of 0.63 ml. of blood per centimetre. When the cord was immediately clamped at the placental end in another group and then ligated at the umbilicus after it had stopped pulsating, it was found to contain only 0.072 ml. of blood per cm., so that immediate clamping of the cord at the placental end with later ligation at the usual site will result in a gain of 20 to 30 ml. of blood to the average infant.

S. S. B. Gilder

954. **Full-Term Labor after a Subtotal Hysterectomy in Double Uterus.**
By H. ACOSTA-SISON. *Amer. J. Obstet. Gynec.*, **54**, 129–131, July 1947. 3 refs.

955. **The Management of Delivery Following Stillbirth from Previous Dystocia.**
By A. B. HUNT. and R. W. DE VOE. *Amer. J. Obstet. Gynec*, **53**, 812–816, May 1947. 1 ref.

956. **Active Conduct of Labour in Breech Presentations.** (Zur aktiven Geburtsleitung bei Beckenendlagen.)
By F. HOFF. *Wien. klin. Wschr.*, **59**, 381–385, June 13, 1947. 3 figs., 10 refs.

957. **The Management of Breech Presentation.**
By D. F. ANDERSON. *Med. Press*, **217**, 434–436, May 21, 1947.

958. **Management of Breech Presentation.**
By J. M. WHITFIELD. *West Virginia med. J.*, **43**, 266–269, Aug. 1947.

959. **The Genesis of Central Rupture of the Cervix Uteri.** (Zur Genese der zentralen Cervixruptur.)
By A. STINGEL. *Wien. klin. Wschr.*, **59**, 462–464, July 18, 1947. 17 refs.

960. **Acute Postpartum inversion of the Uterus.** (Inversão aguda do útero posparto.)
By J. DIAS AYRES. *An. paul. Med. Cir.*, **53**, 309–316, May 1947. 1 fig., 12 refs.

961. **Postpartum Hemorrhage and Shock.**
By R. D. MUSSEY. *J. med. Ass. Georgia*, **36**, 251–258, July 1947. 7 refs.

962. **Prophylactic Use of Penicillin in Retained Placenta.** (Beitrag zur prophylaktischen Anwendung des Penicillins bei Plazentarresten.)
By E. NAVRATIL. *Wien. klin. Wschr.*, **59**, 363–365, June 6, 1947. 14 refs.

963. **Monoamniotic Twins.**
By D. COULTON, A. T. HERTIG and W. N. LONG. *Amer. J. Obstet. Gynec.*, **54**, 119–123, July 1947. 8 refs.

964. **A Further Description of a Set of Quadriovular Quadruplets.** (A Study of Dermal Configurations and Tooth Eruption.)
By N. F. WALKER. *Amer. J. Obstet. Gynec.*, **54**, 266–272, Aug. 1947. 2 figs., 17 refs.

ANAESTHETICS, ANALGESICS

965. **Anesthesia in Obstetrics.**
By J. P. GREENHILL. *Amer. J. Obstet. Gynec.*, **54**, 72–81, July 1947. 22 refs.

966. **Painless Childbirth.**
By O. SCHMAHMANN. *S. Afr. med. J.*, **21**, 597–600, Aug. 23, 1947. 27 refs.

967. **Combined Evipal and Scopolamine Analgesia and Cyclopropane Anesthesia in Obstetrics.**
By H. E. ANDERSON. *Amer. J. Obstet. Gynec.*, **53**, 758–765, May 1947. 12 refs.

In a series of 700 obstetric cases analgesia was effected by the use of " evipan sodium " (hexobarbitone soluble) rectally, together with scopolamine hydrobromide hypodermically, and cyclopropane anaesthesia at the time of delivery. Reference is made to a previous series of 53 cases in which the same analgesics were used, but second-stage anaesthesia was produced by open ether, and also to reports by other workers of success with these preparations.

The drugs were administered when: (1) the patient was definitely in labour; (2) complaint was made of pain; and (3) the cervix was taken up and 2 to 3 cm. dilated. Evipan, 1.5 g., was dissolved in 60 ml. of tap water and allowed to run into the rectum through a funnel by gravity, a soft rubber catheter being inserted high enough to introduce the solution above the presenting part. Scopolamine hydrobromide, gr. 1/150 (0.4 mg.) was given hypodermically at the same time and repeated in doses of gr. 1/200 (0.32 mg.) after an hour or later in labour as required for good amnesia; the second dose was required in only 25 per cent of cases. Cyclopropane anaesthesia was used only when delivery was imminent and the patient had been transferred to the delivery room.

A satisfactory degree of analgesia and amnesia was obtained. Undue excitement during a pain occurred in 5 per cent of patients, but all had complete amnesia. Constant nursing attendance was necessary; 1½ to 2 hours' sleep after delivery was usual. Early in the series a number of patients who had had castor oil for induction of labour failed to obtain complete amnesia, but with abandonment of the use of castor oil no further failures occurred. No maternal deaths were recorded, and the duration of labour was not increased; too early administration of the drugs may cause labour to cease. There is no evidence that the method is unsuitable for toxaemic patients. The normal technique of administration of cyclopropane was employed, but elaborate precautions were taken against the risk of explosion.

The 705 babies delivered included 5 sets of twins; there were 674 vertex and 31 breech presentations. There were 4 stillbirths—1 due to meningocele, 1 to prematurity with placenta praevia, 1 to intrauterine death at 17 weeks, and 1 to prolapsed cord. Foetal asphyxia did not occur and only 50 babies required resuscitation; no evidence was found of ill effects through analgesia late in labour. Lacerations which required suture were encountered 31 times, and in 1 case the cervix was deliberately incised to facilitate delivery.

Low-forceps delivery was performed in 312 cases, and mid-pelvic forceps application was needed in 47. The author has no hesitation in applying low forceps to shorten labour and reduce trauma to the foetal skull; there was no increase in the incidence of mid-pelvic forceps deliveries.

The patients were mainly of Northern European stock and had been adequately prepared psychologically for labour. Nitrous oxide and ether are mentioned as having an inhibitory effect on the uterus and on the foetal respiratory centre. Local pudendal block with 1 per cent " novocain " (procaine) was found satisfactory, in the absence of an anaesthetist. The high oxygen ratio used with cyclopropane is said to be partly responsible for the low rate of infant resuscitation. An increase in the low-forceps rate is admitted, but is stated to be no greater than with any other barbiturate; there was an absence of local rectal reaction. It is suggested that the cervical laceration rate of 4 per cent is a tribute to the relaxing qualities of the drugs used.

Hugh R. Arthur

968. **Sigmodal in Obstetrics. Clinical Observations with a Report of Three Reactions.**
By A. M. LILIENFELD and D. McC. DIXON. *Bull. Sch. Med., Maryland*, **31**, 135–143, Apr. 1947. 7 refs.

The effect of " sigmodal " (5-sed. amyl-5-beta-bromallyl barbituric acid) in labour was studied in a total of 391 patients. This little known barbiturate was clinically investigated first by Emmert and Goldschmidt in 1936; these authors published their results in a final series of 550 cases in 1941. A series of 166 cases was reported by Watson in 1942. In the present cases the drug was administered through a thin urethral catheter into the rectum. A dose of 3 gr. (0.2 g.) of " seconal " was given when the patient became uncomfortable, and the sigmodal was given when the cervix was 4 cm. dilated in a primigravida or, regardless of cervical dilatation, when uterine contractions were lasting for at least 35 seconds in a multipara. Within 5 to 15 minutes of the patient's receiving and retaining the sigmodal she shows signs of increasing drowsiness and generally falls asleep. A second dose is sometimes necessary. The first dose consists of 10 ml. of the preparation; the second, when needed, of not more than 5 ml. This dose may be repeated every 3 or 4 hours. In about 90 per cent of cases delivery is accomplished by episiotomy and the use of low forceps. A total of 223 cases was analysed for amnesic effect. In 75 3 per cent there was complete amnesia; in 16.2 per cent almost complete or partial amnesia; and in 8.5 per cent no amnesic effect was obtained. The drug appeared to have no effect upon blood pressure, pulse rate, respiration rate, or foetal heart rate, and 83.6 per cent of infants did not require any active resuscitation. Excitement and muscular twitchings were seen in a varying number of patients. In 3 cases severe respiratory depression occurred. These serious reactions may have been caused by variations in the nature of the drug, but were more probably due to overdosage and to the added anoxaemic effect of nitrous oxide. The question of over dosage is being further studied by means of blood-level determinations.

Falkland L. Cary

969. **Self-induced Nitrous Oxide Analgesia in Labour.** (Autoanalgésie obstetricale au protoxyde d'azote.)

By P. LANTUÈJOUL, J. BOUREAU and R. CHAMBRAUD. *Gynéc. Obstét.*, **46**, 293–297, 1947. 2 figs., 6 refs.

970. **Oxygen Therapy and Obstetric Analgesia by Nitrous oxide in Closed Circuit.** (Oxygénothérapie et analgésie obstétricale au protoxyde d'azote en circuit fermé.)

By J. SCÉMLA. *Bull. méd., Paris*, **61**, 311–312, July 21, 1947.

971. **Saddle Block Anesthesia in Obstetrics. A Preliminary Survey of 50 Cases.**

By E. L. KING and I. DYER. *New Orleans med. surg. J.*, **100**, 70–72, Aug. 1947.

972. **Use of Caudal Anesthesia in Obstetrics.**

By D. WALL. *J. Iowa St. med. Soc.*, **37**, 201–202, May 1947. 1 ref.

973. **Can Spinal Analgesia Nowadays be used Without Danger in Obstetrics?** (Peut-on utiliser de nos jours sans danger l'anesthésie rachidienne en obstétrique?)

By P. PAQUET. *Rev. franc. Gynéc. Obstét.*, **42**, 198–202, June 1947. 5 refs.

974. **Spinal Anesthesia for Pelvic Delivery.**

By P. S. MARCUS, J. W. TUNNELL and L. H. WILKINSON. *New Engl. J. Med.*, **237**, 258–261, Aug. 21, 1947. 11 refs.

975. **Painless Labors Following Presacral Neurectomy.**

By G. BLINICK. *Amer. J. Obstet. Gynec.*, **54**, 148–151, July 1947. 20 refs.

PUERPERIUM

976. **Factors Influencing the Post-Partum Period and Early Puerperium.** (Om efterbördsskiftet och den tidigare delen av puerperiet samt därpå inverkande faktorer.)

By H. SAURAMO. *Nord. Med.*, **34**, 1095–1100, May 9, 1947. 33 refs.

The author has collected a material comprising 2,000 uncomplicated spontaneous deliveries in 1936 and 1945 for the purpose of discovering the factors which may influence the postpartum and puerperal infections. The following observations were made on the basis of this material: (1) Advanced prophylaxis has evidently increased the number of uncomplicated spontaneous deliveries and decreased the incidence of albuminuria-nephropathy. (2) Puerperal infections in spontaneous deliveries have not diminished. (3) Young parturients, and especially primiparae, for whom the deliveries are often strenuous, are particularly liable to puerperal infections. (4) Earlier infections in the genitalia, episiotomies of the second degree, or perineal rupture may increase the number of puerperal infections. (5) An internal examination properly done and rupture of the membranes do not cause an increase of puerperal infections. (6) A prolongation of the postpartum period does not, evidently, reduce the incidence of puerperal infection or retention of parts of the placenta. (7) the duration of the postpartum is longer, on an average, in such cases in which bleeding has been abundant during the postpartum period (atony). (8) If haemorrhage is profuse during or/and after the postpartum period puerperal infections are obviously more frequent.

The following conclusions were drawn: (1) Prophylaxis with respect to mother and child is very important and should be started before pregnancy. (2) The delivery as a whole is not so physiological in Finland as among primitive

peoples. (3) Special attention should be paid to the treatment of the primiparae. (4) The question whether pituitary preparations should be administered intravenously directly after the delivery or only when required still remains to be solved. Regular intramuscular injections of constricting drugs in childbirth or at least to primiparae may be considered a practical and physiological measure on the basis of experience regarding the state of present-day parturients.—[Author's summary.]

977. **Early Ambulation in the Practice of Obstetrics.** By E. C. Bruant. *Canad. med. Ass. J.*, **57**, 257–259, Sept. 1947. 7 refs.

978. **Gastric and Duodenal Ulcers in the Puerperium.** (Las úlceras de estómago y duodeno en el estado puerperal.)
By G. R. Firpo. *An brasil. Ginec.*, **12**, 317-327, Apr. 1947. 28 refs.

979. **Acute Pulmonary Oedema after Parturition in Previously Healthy Subjects.** (Acuut longoedeem na de baring bij tevoren geheel gezonde vrouwen.)
By G. A. Lindeboom. *Ned. Tijdschr. Geneesk.*, **3**, 2277–2282, Aug. 16, 1947. 8 refs.

980. **Treatment of Puerperal Fever.** (Zur Therapie des Puerperalfiebers.)
By V. Grunberger. *Wien. klin. Wschr.*, **59**, 357–359, June 6, 1947.

981. **Operative Obstetrics and Puerperal Sepsis.** (Operatoria obstetrica y sepsis puerperal.)
By E. M. Baldi. *An. brasil. Ginec.*, **12**, 279–316, Apr. 1947. 1 fig.

982. **Pneumococcal Peritonitis in Gynaecology and Obstetrics.** (Beitrag zur Pneumokokkenperitonitis in der Gynäkologie und Gerburtshilfe.)
By T. Rust. *Gynaecolicia, Basel.*, **124**, 42–55, July 1947. 15 refs.

983. **Penicillin Treatment of Infected Obstetric Cases.** (De la pénicillinothérapie au cas d'infections de nature obstétricale.)
By — Portes and — Mayer. *Gynécologie*, **44**, 51–75, Mar.–Apr. 1947.

984. **On the Sulfathiazole Treatment of Puerperal Infections.** [In English.]
By R. Fahraeus. *Gynaecologia, Basel*, **123**, 386–390, June 1947.

985. **Rupture of Puerperal Ovarian Abscess.** (La rupture des ovarites suppurées puerpérales.)
By P. Trillat and A. Notter. *Gynéc. Obstét.*, **46**, 161–166, 1947. 9 refs.

986. **Influence of Fever on Lactation in the Early Puerperium.** (Der Einfluss des Fiebers auf die Laktation im Frühwochenbett.)
By W. H. Thiele. *Dtsch. med. Wschr.*, **72**, 286–288, June 6, 1947. 2 figs., 8 refs.

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987. **Penicillin Treatment of Puerperal Mastitis.** (Il trattamento delle mastiti puerperali con penicillina.)
By V. Svrjuga. *Ginecologia, Torino*, **13**, 219–226, May 1947. 12 refs.

988. **Metabolism of Women During the Reproduction Cycle. XI. Vitamin C in Diets, Breast Milk, Blood and Urine of Nursing Mothers.**
By B. Munks, M. Kaucher, E. Z. Moyer, M. E. Harris and I. G. Macy. *J. Nutrit.*, **33**, 601–619, June 1947. 29 refs.

989. **Metabolism of Women During the Reproductive Cycle. XII. The Effect of Multi-vitamin Supplements on the Vitamin C Utilization of Nursing Mothers.**
By J. P. Pratt, B. Munks and I. G. Macy. *J. Nutrit.*, **33**, 621–632, June 1947. 22 refs.

990. **Effect of Synthetic Oestrogens on Initiation of Lactation.** (Action des oestrogènes de synthèse sur la montée laiteuse.)
By F. Lepage. *Bull. méd., Paris*, **61**, 309, July 21, 1947.

991. **Ethinyl-oestradiol as an Inhibitor of Lactation.** (El valor del etinilestradiol como inhibidor de la secreción láctea.)
By R. M. Gori and E. Bayona. *An brasil. Ginec.*, **12**, 266–278, Apr. 1947. Bibliography.

THE INFANT

992. **Somatic Features of the Newborn in the Five-year Period of War, 1941-1945.** (Le condizioni somatiche del neonato nel quinquennio di guerra, 1941–1945.)
By R. Chicco. *Arch. Ostet. Ginec.*, **42**, 81–94, Mar.–Apr. 1947. 37 refs.

993. **Survival of a Baby Weighing 24 oz. at Birth.**
By J. P. Bush. *Lancet*, **1**, 909–910, June 28, 1947.

994. **Blood-urea in the First Nine Days of Life.**
By R. McCance and E. M. Widdowson, *Lancet*, **1**, 787–788, June 7, 1947. 12 refs.

As part of a general study of renal function in early life the blood-urea levels of 12 normal full-time breast-fed babies were examined. Samples of blood were taken from the umbilical cord at birth, and from the heel on the third, sixth, and eighth or ninth days of life, and the urea was determined by Lee and Widdowson's method (*Biochem. J.*, 1937, **31**, 2035). The blood-urea levels rose from about 18.9 (8.0 to 28.8) mg. per 100 ml. at birth to about 29.1 (18.5 to 39.6) on the third day, and then fell to about 16.8 (10.4 to 25) mg. per 100 ml. on the eighth day. It is suggested that the functional dependence of the kidney on the state of hydration of the body is the main reason for the rise and subsequent fall. The relative inefficiency of the kidney during the first few days of life might be a contributory factor. *J. E. Page*

995. **Study of Carbohydrate Metabolism of the Newborn and Infants on the Basis of Double Glucose and Galactose Tolerance Tests.** (Beiträge zum Zuckerstoffweschsel Neugeborener und Säuglinge auf Grund Doppelbelastungen mit Glucose und Galactose.)

By L. BARTA and A. SASS-KORTSAK. *Pædiat. danub.* **1**, 88–112, Feb. 1947. 4 figs., 33 refs.

This article records an interesting and probably unique series of sugar tolerance tests with glucose and galactose on newborn infants, some within 12 hours of birth, and on infants from 1 to 20 months old. In the majority the results were very similar to the adult response. Galactose was usually perfectly tolerated, no increase occurring in the blood after 6 to 10 g. had been given; glucose was sometimes less perfectly tolerated. A second dose of the sugars, to evoke a Staub-Traugott reaction, gave irregular results. It is suggested that abnormally high curves are due to " functional lability " of the liver.

R. D. Lawrence

996. **The Pathologist's Contribution to the Clinical Interpretation of Disorder of the Newborn.**

By E. L. POTTER. *Amer. J. clin. Path.* **17**, 524–528, July 1947.

997. **Resuscitation of Newborn.**

By R. M. STRINGER. *Canad. med. Ass. J.* **57**, 140–142, Aug. 1947. 1 fig., 6 refs.

998. **New Methods of Treatment of Asphyxia Neonatorum.** (Neue Methoden in der Behandlung asphyktischer Neugeborener.)

By W. BICKENBACH. *Dtsch. med. Wschr.*, **72**, 434–437, Aug. 15, 1947. 14 refs.

999. **Asphyxia of the Newborn.** (Asfixia do recémnascido.)

By R. BRIQUET. *An brasil. Ginec.*, **12**, 81–101, Feb. 1947. Bibliography.

1000. **Paroxysmal Tachycardia and Flutter in the Newborn.** (Zur Frage der paroxysmalen Tachykardie und des Herzflatterns in den ersten Lebenswochen.)

By E. FRISELL. *Acta paediatr., Stockh.*, **34**, 30–45, Mar. 15, 1947. 3 figs., 21 refs.

Paroxysmal tachycardia and flutter in the newborn are rare but important, since they may be fatal, but respond readily to digitalis. Cases of paroxysmal tachycardia have been described in various periods of infancy, but no case of flutter in infancy after the first 2 weeks has been described. Only cases of paroxysmal tachycardia occuring in the first 2 weeks of life are considered here.

In paroxysmal tachycardia in adults the pulse rate is between 150 and 200 per minute; in infants it may be as rapid as 250 to 300 per minute. In auricular flutter the response of the ventricles to auricular contraction may vary from time to time in the same individual. The normal pulse rate in the neonatal period is 110 to 140, and it may rise to 180 or more if the infant is restless or ill. At this rate the pulse is difficult to count, and no doubt paroxysmal tachycardia or flutter is frequently missed and is often only diagnosed electrocardiographically. Pulse rates of over 200 should arouse suspicion. Signs of heart failure may develop very late and be atypical; drowiness, refusal of feeds, and vomiting may be symptoms. Little is known of the aetiology of these conditions. Of the 37 cases under 1 year old described in the literature, congenital heart disease was present in 3 (confirmed at necropsy) and suspected in 4. It has been supposed that these arrhythmias are due to a lack of central or autonomic nervous system control; this would perhaps account for the frequent onset soon after birth. Even the electrocardiogram may be very difficult to interpret; unless a P wave is clearly shown or the response in auricular flutter is less than 1:1, the distinction between flutter and paroxysmal tachycardia may be impossible.

Seventeen cases have been collected from the literature; the electrocardiograms show that rates of over 300 were present in flutter and under 300 in paroxysmal tachycardia. It is striking that in the new-born signs of heart failure may be minimal; signs frequently found are raised respiratory rate (60 to 80 per minute), slight cyanosis and enlargement of the liver; there may also be signs of pulmonary congestion and slight cardiac enlargement.

Many drugs—morphine, quinine, quinidine, physostigmine, pilocarpine, and various sedatives—have been used in treatment without success: on the other hand, digitalis is very effective. This drug must be given cautiously; one case is described in which, after 0.1 g. digitalis intramuscularly, the heart rate slowed from 272 to 143 in 1 hour and immediately afterwards two short attacks of ventricular fibrillation occured. Complete heart-block has also been noted after digitalis administration. The dose required for full digitalization should be calculated according to the weight of the infant, 0.05 to 0.1 g. being given as an initial dose and 0.05 g. then repeated as required. Alternatively, half the full dose for digitalization may be given at once and one-quarter after 4 hours. Normal rhythm is usually re-established in from a few hours to 2 days. The effects of treatment are difficult to assess on account of the tendency to spontaneous remission in the new-born. In one of the 17 cases described digitalis had no effect, but later the condition cleared up without further treatment. On the other hand, 2 of the 17 infants died without other demonstrable causes than the paroxysmal tachycardia. One infant had recurrent attacks and relapsed in spite of digitalis; the condition was not diagnosed until the child was 4 months old, although symptoms had been present intermittently from birth.

The author describes a case in which cardiac irregularity was diagnosed antepartum. The elec-

trocardiogram showed a 2 : 1 block with an auricular rate of 440. The infant had a heart rate of 220 for 4 weeks without any symptoms. At 4 weeks, digitalis 2.5 mg. 3 times a day was started and the rhythm became normal after 4 days, the dose being reduced to 2.5 mg. daily for a further 5 days and then discontinued. No relapse occurred.

Mary J. Wilmers

1001. **Lesions Transmitted to the Foetus through the Placenta.** (Moléstias que se transmitem ao feto atravéz a placenta.)

By T. Dias Castejon. *Rev. Ginec. Obstet.*, **1**, 407–420, July 26, 1947. 15 refs.

1002. **Microcephaly in Three Successive Pregnancies.**

By L. Newton and T. S. McLean. *Connecticut med. J.*, **11**, 617–619, Aug. 1947. 6 refs.

1003. **Multiple Malformations of a Foetus. Remarks on the " short neck ".** (Malformation multiples d'un fœtus. Remarques sur le " cou court ".)

By L. Gioanni. *Rev. franç. Gynéc. Obstét.* **42**, 210–217, June 1947. 2 figs.

1004. **Congenital Hypertrophic Pyloric Stenosis.** (La stenosi ipertrofica congenita del piloro. (Ricerche istopatologiche.))

By G. Niero. *Clin. pediat., Bologna*, **29**, 13–47, Jan. 1947. 20 figs., 43 refs.

More is known about the clinical picture of congenital hypertrophic pyloric stenosis than about its pathogenesis and histopathology. According to Nasso (*Rossegna Clinico Scientifica*, 1941, **19**, 425) no spastic condition is known which would produce hypertrophy and hyperplasia similar to that in stenosis of the pylorus. The clinical and the histological findings show different degrees from spasm to hypertrophy. The question arises whether the spasm is the primary cause of the stenosis or hypertrophy. The author considers that there is always a congenital malformation in addition to the spastic factor. He describes 5 patients who were operated upon, of whom 4 survived and 1 died. The operations were all performed according to the technique of Hildebrand.

In early embryological development of the muscularis the circular layer develops first (in the middle of the second month at the lesser curvature). In the pyloric region the circular muscular layer quickly develops a thickening, regarded by various writers as the primitive pyloric sphincter. According to the author this muscular hyperplasia involves the whole pyloric canal and only the distal part of this forms the pyloric sphincter, in the formation of which the longitudinal fibres will also participate; these appear rather late—about the fourth month. The mucous membrane of the pylorus develops later (ninth week). A special reticulum is formed simultaneously with the muscular layers and probably gives origin to the myenteric plexus of Auerbach. The pyloric canal or antrum is different from the sphincter. Its function differs because, while the antrum empties, the stomach has to overcome the resistance of the sphincter. In the foetus there is, however, no such difference, and there is no separate pyloric sphincter. The whole antrum has to act as one, and the muscle layer of the antrum of the foetus is much more developed than that of an infant of a week old. Cocchi (*Il Lattante*, 1937, **5**, 317) maintains that apart from the hypertrophy of the muscular layer, especially of the circular layer, there is a fold consisting of the mucous membrane and the submucosa also, which he calls the valve of the antrum. In hypertrophic pyloric stenosis the antrum and mainly its circular muscle take part in the hypertrophy. The connective tissue is not involved, according to some authors, though others did find connective tissue, and especially some elastic tissue, responsible for the increase in size of the pylorus.

Changes in the autonomic nervous apparatus have been looked for, and certain non-conclusive changes have often been found, which would account for the pathogenesis, associating spasm with the malformation. Wolstein (*Amer. J. Dis. Children*, 1922, **23**, 511), in observations on children who had died after the operation, found that the full restitution of the pylorus took from 3 months to 2 years. It seems to the author that a temporary suppression of nervous conduction at the area of the malformation is sufficient to cause restitution. Cornil and Mosinger in 1933 found over-development of the Auerbach and Meissner plexuses. At certain points the Auerbach plexus was seen to be thickened, almost showing the picture of a sympathetic neuroma. The increase in stimuli from this nervous tissue could create conditions leading to hypertrophy of the muscular layers. The nervous elements have the function during foetal life of co-ordinating the development of the various tissues, and it is logical to assume that the hypertrophy of the nervous tissue precedes that of the muscle.

In the foetus at the end of the fourth month the canal of pyloric antrum differs from the other parts of the stomach in the greater development of the circular muscular layer. There is also a difference in the longitudinal muscle of the distal part of the antrum, from which the later pyloric sphincter has to develop. The circular muscle layer gradually increases from the proximal part of the antrum towards its distal end. At the extreme end of the pyloric antrum there is a hyperplasia of the nerve elements accompanying the longitudal muscular layer on its oblique course through the circular layer up to the submucosa. The Auerbach plexus forms a markedly developed plexus at the sphincter. The structure of the pyloric antrum in the foetus at the seventh and eight months or in the new-born is substantially the same.

The author, using Mallory and Bielschowsky

staining methods, examined specimens from 4 male infants and 1 female infant. The male infants were cured by operation while the female died. The examination of the pylorus in each case showed that all elements participated in the hypertrophy of the pyloric antrum. Collagenous, muscle, and nerve elements were all increased and the structure of the muscle in these cases had remained the same as would be found in embryos at 7 or 8 months. In normal infants the pyloric canal is less thick at birth than in foetal life, but in cases of hypertrophy, the antrum after 30 to 60 days shows the same thickness and structure as in embryos. In infants the pylorus, together with the stomach, should become thinner as the stomach acquires a greater capacity. This cannot happen in the malformation, which the author calls a "local gigantism" of all the tissues taking part in the formation of the pylorus. In this sense the hypertrophy of the pylorus has to be looked upon as a malformation of the pylorus as a whole, and not as one of the muscular layers alone. The author assumes that the hypertrophied nerve elements of the plexus produce the hypertrophy and hyperplasia of the various tissues. He considers two factors essential: (1) arrest development of the antral portion, which conserves its typical foetal structure; (2) local hypertrophy and hyperplasia of all tissue elements governed by the alterations in nervous tissue. Normal distension of the stomach cannot occur because of the malformation, but there is superimposed spastic element.

E. Forrai

1005. **Lacunar Skull (Lückenschadel) of the Newborn. Report of Seven Cases.**

By R. G. KARSHNER and D. L. REEVES. *Amer. J. Roentgenol.*, **57**, 321–328, Mar. 1947. 8 figs., 26 refs.

Lacunar skull, an anomaly of the newborn associated usually with spina bifida and occasionally with cranium bifidum, was first described in 1771. Radiologically there is general diminution of thickness and variation in density, associated with delay in ossification of the flat bones of the skull; this leaves patches of rarefaction or lacunae with interlacing ridges of increased density. These defects are more commonly present in the frontal and parietal regions.

The condition is probably much more common than it was at one time thought to be. In a survey of the literature, it was found in nearly 1 per cent of all infants born. The authors report 7 cases, 2 of which were not associated with spina bifida or cranium bifidum, but all showed some congenital abnormalities. They discuss the various theories concerning its aetiology, and attach more credence to the view that it is due to a congenital developmental imperfection than to the more commonly held theories of imbalance between the intracranial pressure and the extracranial pressure exerted by amniotic fluid.

L. G. Blair

1006. **Pathogenesis of Mongolism.**

By T. H. INGALLS. *Amer. J. Dis. Child*, **73**, 279–292, Mar. 1947. 4 figs., 34 refs.

The view is expressed that, whatever the cause of mongolism may be, the condition originates between the sixth and ninth week in foetal life. Pathological studies of mongolism show that no system escapes at least occasional anomalous development. The various defects encountered are reviewed, and observations are made on the findings at 50 necropsies.

The essential cranial abnormalities were moderate microcephaly, brachycephaly, and dwarfism of the basilar bones, glabellum, nasal bones, and maxilla. The brain tended to conform to the shape of the skull. The changes in the skull may be due to retarded development of the spheno-occipital epiphyseal mechanism. This change is found when epiphyseal growth is interfered with by such conditions as syphilis and cretinism. There is little evidence to support the view that vascular anomalies, either traumatic or developmental, play any part. It is thought that the developmental abnormalities found in mongolism originate before the third month of gestation and represent an arrest or disturbance of growth during the sixth to ninth week. The association of cranial and skeletal abnormalities suggests that precartilage and membranous ossification centres are affected in chance combination. The comparison is made with foetal abnormalities found after maternal rubella.

A. G. Watkins

1007. **Multiple Congenital Defects Following Maternal Varicella. Report of a Case.**

By E. G. LAFORET and C. L. LYNCH. *New. Eng. J. Med.*, **236**, 534–537, Apr. 10, 1947. 24 refs.

Investigations by Gregg and others in Australia have shown that there is a very close association between rubella in early pregnancy and congenital defects in the baby, and a suspicion is growing that the incidence of congenital malformations following other maternal virus infections in pregnancy may be equally high. The authors report in detail a case of maternal varicella in the eighth week of pregnancy, followed by delivery at term of an infant with very extensive developmental defects. To cause severe developmental defects, varicella or other virus disease must apparently occur in the first trimester of pregnancy. This susceptibility during early pregnancy may be due to the fact that young and relatively undifferentiated cells are much more susceptible to noxious agents than are the more mature cells in the later stages of pregnancy.

The significance of such cases must, however, be accepted with caution, as it is not known how often virus infections occur without congenital malformations and how often malformations occur without virus infections. In a view of the literature the authors were unable to find any references to a case similar to the one they describe.

Jas. M. Smellie

1008. **Early Congenital Syphilis. Treatment of Two Hundred and Fifty-two Patients with Penicillin.**

By R. V. Platou, A. J. Hill, N. R. Ingraham, M. S. Goodwin, E. E. Wilkinson, A. E. Hansen and A. Heyman. *J. Amer. med. Ass.*, **133**, 10–16, Jan. 4, 1947. 11 figs., 1 ref.

The authors report the results of treating with penicillin 252 infants with early congenital syphilis; 219 were negro and 33 white children; 118 were boys and 134 girls. The ages at which treatment was given were as follows: under 3 months, 113; 3 to 6 months, 63; 6 to 12 months, 40 [46 in the text]; and 12 to 24 months, 36. The amount of penicillin employed varied from 770 to 150,000 units per kilo of body weight. Results were much the same in the various age groups, but infants treated in the first 3 months did less well than older ones, probably as a result of lowered resistance; race and sex did not appear to influence the outcome. Spinal fluids of 171 infants were examined before treatment; 22.2 per cent showed Grade I fluids, 29.2 per cent Grade II, and 11.1 per cent Grade III; only 37.4 per cent were normal. It was noted that the older the child the milder the changes in the fluid and the less likely the fluid to be pathological, showing that time alone tends to reverse positive reactions. Treatment had a good effect on fluids, since 72.5 per cent were positive before and 20.9 per cent positive after treatment. The general effects of treatment were satisfactory in 74 per cent, unsatisfactory in 9 per cent, and in 18 per cent could not be evaluated; only 2.4 per cent showed clinical relapse, and the longer the period of observation the better the results, both clinical and serological; most sera became negative between the fourth and twelfth months. Reactions were few and mild, and the authors consider there is no need to start with small doses to avoid side-effects. There were 27 deaths (10.7 per cent), but most of these were attributed to causes other than syphilis. It is concluded that the optimum dosage is 100,000 units per kilo of body weight, that penicillin should be administered every 3 hours over a period of 12 to 15 days, and that it is the best single agent yet employed in the treatment of congenital syphilis.

T. E. Osmond

1009. **Sulphonamide Shock in Infantile Diarrhoea.** (El choque sulfamidico en las diarreas infantiles.)

By A. Montero Rodriguez. *Med. esp.*, **17**, 127–140, Feb. 1947. 2 figs.

Diarrhoea in 155 infants was treated with sulphonamides with 100 per cent recovery rate. The same dose per kilo body weight was given whatever the type of diarrhoea, the diet alone being altered for each case. Sulphathiazole was first tried, in doses of 0.1 to 0.15 g. per kilo per day, with some success. Later the doses were increased to 0.2 to 0.4 g. per kilo 2 or 3 times daily. Cure was usually effected in 24 or 48 hours. "Irgafen" (N-3, 4-dimethylbenzoyl sulphanilamide) was used later in 2 doses of 0.15 g. per kilo, and also "pentaldiazine," *p*-amino-benzene sulphamide-4, 6-dimethylmetadiazine in 2 doses of 0.3 g. per kilo. The author attributes his success to the large doses used in the short period; no toxic effects were seen, nor did any cases go on to chronic marasmus.

[No bacteriology is given, nor is it stated whether there was any selection of cases.]

J. G. Jamieson

1010. **Results Obtained by Streptomycin Treatment in Eight Cases of Diarrhoea with *Bacterium coli* and *Proteus* in the Stools.** (Resultados obtenidos en 8 casos de diarrea con escherichia coli y proteus en las evacuaciones tratados con estreptomicina.)

By A. Aguirre, A. Aguayo and L. Benavides. *Bol. méd. Hosp. infant.*, **4**, 4–23, Jan.–Feb. 1947. 3 refs.

Eight cases of severe infantile diarrhoea are described. The common symptoms were fever, persistent diarrhoea with blood in the stools in 4 cases, anorexia, abdominal meteorism, dehydration (often very intense), and, in many cases, secondary oto-pharyngeal congestion. In all cases colon bacilli were found in the stools. *Bacterium coli-gomez* and *Proteus* were each found in 3 cases. In 7 cases tested both organisms proved susceptible to streptomycin. Intensive treatment with sulphonamides and, in 4 cases, with penicillin failed completely. Symptomatic treatment was maintained during the whole course of the disease. Streptomycin was used after other drugs had failed. It was injected 3-hourly, the dose and length of administration varying from case to case.

The first patient (aged 6 months, weight 6.55 kg.) received from the forty-first day of the disease 50,000 units 3-hourly to a total of 1,000,000 units, when administration was discontinued because fever returned, ascribed to the antibiotic. Improvement was noted 3 days later, but 15 days elapsed before the patient finally recovered. The second patient, aged 7 months, received from the seventeenth day 62,000 units 3-hourly (total 2,000,000). The child was discharged from the hospital apparently cured, but had a relapse 10 days later. Permanent cure followed administration of an additional 1,000,000 units. Of interest in this case is the discovery of *Bacterium coli-gomez* in the stools of a carrier, a cook in the house, and in those of the child during the relapse. The third patient, aged 5 months, who was gravely ill, received from the eighteenth day 100,000 units 3-hourly continued for 60 hours. There was a transient improvement, and 2 days later streptomycin was again given at the former rate. At the end of 4 days urticaria appeared, but faded away a few hours later when the dose was reduced to 50,000 units. The child received a total of 6,000,000 units. Cure was complete 6 days after the end of treament. The fourth patient received from the thirty-third day 100,000 units 3-hourly for 24 hours and then 50,000 units 3-hourly to a total of 3,000,000 units. The child recovered three

days later. The fifth patient, aged 6 months, received 100,000 units 3-hourly for 48 hours, reduced subsequently to 50,000 units per dose to a total of 4,000,000 units. All symptoms subsided except fever, which also disappeared when streptomycin was discontinued. The sixth patient, aged 8 months, was given 100,000 units 3-hourly for 48 hours and subsequently 50,000 units to a total of 4,000,000 units. A temporary improvement during the first days of treatment was followed by an exacerbation and the child died from peritonitis and secondary bronchopneumonia. Laboratory tests proved that although the colon bacilli with salmonella antigens VI and XVIII were still sensitive to streptomycin, *Bacterium coli-gomez* (XXXV), isolated with the two other species from the stools of the child, had developed a marked resistance to the antibiotic. In the seventh patient, the general condition deteriorated steadily, and on the twenty-third day icterus appeared. On the twenty-fourth day streptomycin administration was begun at a rate of 100,000 units 3-hourly to a total of 4,000,000 units. After a temporary improvement during treatment the child started to go downhill, and died from bronchopneumonia and paralytic ileus secondary to the bowel infection. Colon bacilli XXXV and XXX found in the stools were initially sensitive to streptomycin, but no later test was made. A hepatic lesion might have precipitated the termination. The eighth patient received 100,000 units of streptomycin 3-hourly for 4 days, and then 50,000 units 3-hourly for 2 days. An uneventful recovery was complete 6 days after the end of treatment.

As a result of their experience the authors recommend a dose of 100,000 to 150,000 units of streptomycin per kilo per day, according to the severity of the case.

A. Lilker

1011. **Treatment of Infantile Diarrhoea with Pectin-Agar.** (Le traitement de la diarrhée infantile par le pectine-agar.)

By R. PETIT. *Acta pædiat. belg.*, **1**, 50–69, 1946–47. Bibliography.

A history of the use of apples in the treatment of diarrhoea is outlined. This treatment, traceable to folk-lore, was given serious medical support in 1890 and used in Germany in 1926 by Heisler. In 1929 the apple diet for use in paediatrics was devised by Moro in Germany. A sieved preparation of peeled apples was administered for 36 to 48 hours, and supplemented with water or weak tea to cover the daily fluid requirements. To this regime all diarrhoeas—of dietetic, infective, or parenteral origin—were claimed to respond, though chronic forms, as in coeliac disease, were liable to relapse after initial response. This diet was not suitable for patients under 6 months of age, and for infants a modification with apple juice diluted with water or tea was substituted successfully. Another modification, dehydrated powdered apple, has been introduced commercially and has the advantages over the raw fruit regime of simplicity and availability. This is claimed to be as successful as other methods of apple treatment. The author points out that other fruits besides apples have been used with equal success by some workers. He quotes cases from his own experience to show the successful use of both raw and powdered apple diets in infants and children suffering from diarrhoea.

Change in the bacterial flora of the intestine, an astringent effect of tannins, a vitamin action, and the mechanical effect of a large intestinal column of cellulose are mentioned in a discussion of the action of the diet, but pectin is considered to be the chief factor. Pectin is known to possess haemostatic and mild bactericidal properties which may assist its anti-diarrhoea action. This last depends on the presence of an inert accompanying substance, such as cellulose. Purified pectin is ineffective in checking diarrhoea; possibly it is absorbed or digested. The conjugation of pectin with agar-agar is claimed by the author to give results at least equal to those obtained with the apple diet. The formula he used was: pectin 6.3 per cent, agar-agar 4.3 per cent, dextrin-maltose 89.4 per cent. This powder is added to milk in proportions of 1 : 3 by weight (1 : 2 under 6 months), with sugar as usual. This mixture is given eight times a day to the infant or child, the total fluid intake being made up with water. A minimum of 3 days' treatment is advised, the passage of a formed stool being the indication for a gradual transition to normal diet.

[The claims for the apple diet seem extravagant, and no clinical details are provided of cases treated by the pectin-agar method.]

M. MacGregor

1012. **Bacterium coli-gomez, a new Species isolated in a Fatal Case of Diarrhoea.** (Escherichia Coli-Gomez, nueva especie aislada de un caso mortal de diarrea.)

By G. VALERA, A. AGUIRRE and J. CARRILLO. *Bol. méd. Hosp. Infant*, **3**, 623–627, NOV.–DEC. 1947. 4 refs.

After the ingestion of contaminated milk a baby girl, aged 2 months, developed infantile diarrhoea, complicated later by purulent otitis media; she died from a secondary bronchopneumonia. Her stools and the pus from her ear contained a *Bacterium coli* which proved to possess the antigenic properties of the group XXXV (those of *Salmonella adelaida*). In honour of Dr. Federico Gomez this species was named *Bacterium coli-gomez*. Subsequently the species was identified in several other cases.

A. Lilker

1013. **Pemphigus of the Newborn.** (Le pemphigus des nouveau-nés.)

By J. MEMECHE. *Acta paediat. belg.*, **1**, 29–50, 1946–47.

In the first part of this paper the author, after sketching the historical separation of pemphigoid conditions of the newborn one from another and suggesting a classification in terms of bacterial cause, describes the clinical appearances of pemphigus neonatorum, emphasizing the absence of crusting, the maximum incidence on abdomen and thighs on the second to the seventh post-natal day, the duration (1 to 2 weeks) with possible relapse, and the absence of fever or constitutional disturbance. The common complication is conjunctivitis, but furunculosis, lymphadenitis and (rarely) septicaemia may occur, and gangrene of the limbs may be seen. The rare but grave exfoliative form of the disease (malignant pemphigus) is described; it is characterized by rapid extension of the lesions, pronounced general symptoms, and the presence of Nikolsky's sign; it is usually fatal in 24 to 48 hours. Histologically the distinction between this and the milder form is that the latter is confined to the stratum granulosum of the epidermis, while the former extends more deeply, involving the corium.

Evidence is presented to show that every case is due to a staphylococcal infection of external origin. The incubation period is 1 to 5 days, and mortality varies from 1 to 2 per cent in sporadic cases to the neighbourhood of 100 per cent in epidemics. Differential diagnosis includes epidermolysis bullosa, burns, Leiner's erythrodermia, and dermatitis medicamentosa. Prophylaxis, which is more important than treatment, includes attention to the hygiene of mothers, nurses, and attendants on the infants. Visiting should be minimal. For treatment application of penicillin ointment is best; failing that the author recommends potassium permanganate bathing, opening the bullae, and application of mercurochrome and sulphonamide powder, with heliotherapy and systemic administration of penicillin if required. The hydration of the infant must be maintained.

In the second part of the paper the author considers cases of pemphigus occurring in the maternity department of the Hospital of St. Pierre in Brussels in the period 1931 to 1944. From 1933 to 1941 there were 171 cases in 8,230 deliveries (2 per cent). The incidence was greatest in 1934 and fell steadily till 1936, after which it remained approximately level until 1941. In this period mortality was 1.75 per cent. At the same time the incidence of staphylococcal complications in the mothers of this group was 13.4 per cent, contrasted with a general incidence of only 2.25 per cent. Breast infections constituted over 50 per cent of these. Close parallelism was shown in the bacteriology of the maternal lesions and of the contents of the infants' bullae. There was no relation between the vaginal flora of the mothers and the contents of bullae, nor was the incidence of pemphigus related to the complications of labour.

In 1943 and 1944 pemphigus increased in incidence to 7.38 and 9.68 per cent of deliveries respectively, the peak incidence being in May, 1944. This increase, which was shared by other maternity units, is considered by the author to be due to a general relaxation in standards of hygiene resulting from the war. He notes that premature infants were less affected than larger babies; this is attributed to better nursing. The following appeared to have no influence: the race of the infant, the type of feeding, and the maternal vaginal flora (several cases occurred after Caesaeran deliveries). Most cases started after the fifth day. The use of a subcutaneous vaccine [presumably of killed staphylococcal organisms] within 24 hours of birth did not influence the incidence but seemed to delay the time of onset. Mortality in these 2 years was nil.

M. MacGregor

1014. **Infantile Beri-beri in Singapore during the Latter Part of the Japanese Occupation.**

By G. HARIDAS. *Arch. Dis. Childh.*, **22**, 22–33, Mar. 1947. 2 figs., 19 refs.

The problems presented by infantile beri-beri in the Kandang Karbau Hospital in Japanese-occupied Singapore differed from those of peace-time owing to lack of essential foods and medicines. For example, thiamine had often to be given in too small doses and too late. Secondary infection and associated avitaminoses A, B, and D, were more common than in peace time. The poor economic status of the families which provided the cases is stressed. Out of 139 patients 77 died, a mortality of 55.41 per cent compared with 49.47 per cent in 1938. Beri-beri occurred in 16 infants artificially fed on food poor in vitamins and 123 breast-fed infants. Symptoms appeared between 7 days and 2 years of age, the highest incidence being between 1 and 4 months. Problems of infant feeding are discussed and detailed recipes are given for the preparation of soya-bean milk and supplemented rice gruel. In Malays and Tamils the disease was rare; bananas were often added to the diet of the Malayan infants, and other foods such as ragi to that of Tamil infants.

The cases are analysed and divided into: (1) aphonic; (2) peripheral neuritic; (3) pseudo-meningeal; and (4) cardiac. The commonest type was a combination of (2) and (4); next in order of frequency was type (4), and then type (3) with various combinations. These variations are described fully. The cardiac cases gave rise to the severest symptoms and the greatest number of deaths. The need for careful case-taking and examination, with inquiry into the health and diet of the mother is stressed. Respiratory and gastro-intestinal infections were common exciting causes. The patients were further divided into well-nourished children and others, and the presenting symptoms of these groups are described.

Direct laryngoscopy was performed on some of

the aphonic cases, and oedema in the region of the arytenoids was seen, a suggested explanation (an alternative to recurrent laryngeal paralysis) of the aphonia. Lumbar puncture in the meningitic cases showed the fluid to be under increased pressure but no increase in cells or protein. Post-mortem findings are briefly stated and the differential diagnosis and prognosis are discussed. In the aphonic type it took about 6 weeks for the voice to recover. In the uncomplicated pseudo-meningeal type the prognosis was good. In the cardiac type with cold, clammy hands and feet or bronchial breathing and crepitations at the bases the prognosis was poor. Expiratory grunt was an unmistakable sign of an acute cardiac attack, and its disappearance an early sign of recovery. A follow-up of patients who recovered from an acute cardiac attack showed that, given the same chances as a normal infant, they invariably grew up to be healthy individuals. The dietetic, prophylactic, specific and symptomatic treatment of the mother and infant is described.

J. B. Mitchell

1015. **Pathogenesis of Erythroblastosis Fetalis; Statistical Evidence.**

By A. S. WIENER. *Amer. J. clin. Path.*, **16**, 761–767, Dec. 1946. 14 refs.

In 97 families in which there was erythroblastosis the type of antibody in the mother's serum was studied in relation to the child's disease. Twenty-five mothers had the ordinary complete antibody, and in these cases 16 of the infants had icterus gravis, 7 had haemolytic anaemia, and only 2 were stillborn. Where 57 mothers had incomplete or blocking antibodies, only 8 infants had icterus gravis, and 24 haemolytic anaemia, while 25 were stillborn. Where both types of antibody were present the incomplete antibody appeared to influence the type of disease. The author suggests that this may be due to the fact that the molecule of incomplete or univalent antibodies is smaller and passes more easily through the placenta.

M. Le Vay

1016. **The Clinical Signficance of Rh Antibodies (Rh Agglutinins and Blocking Antibodies) in the Sera of Rh-negative Mothers; A Study of 179 Cases.**

By J. HOWARD, S. P. LUCIA, M. L. HUNT and B. C. MCIVOR. *Amer. J. Obstet. Gynec.*, **53**, 569–595, Apr. 1947. 12 figs., 45 refs.

The authors, working at the California University Medical School, studied the antibody titre of 179 Rh-negative expectant mothers in an effort to correlate the laboratory findings with the clinical condition of the babies at birth. The maternal sera were examined several times during pregnancy and puerperium for both complete and incomplete antibodies. The investigations were carried out in 1944–5, and the latter type of antibody was detected by its blocking activity with Rh_0 (cDe/cde or cDe/cDe) cells and not by the Race-Coombs test. Cord blood from the babies was typed soon after birth. The blood of the husbands and previous children of the subjects was also typed where possible, but no detailed information is given on the latter results.

The 179 pregnancies are divided into four groups according to the condition of the child at birth: group 1, normal Rh-negative children; group 2, normal Rh-positive children; group 3, "sub-clinical" haemolytic disease of the newborn; group 4, severe haemolytic disease of the newborn. In group 1 (61 cases), only 9 showed isolated complete anti-Rh antibodies, probably carried over from previous pregnancies. Group 2 (78 cases) again showed no antepartum antibody production, but a small titre of either complete or incomplete antibody might appear postpartum, reaching a maximum usually in the second week. There was no significant difference between primiparous and multiparous women. Group 3 (17 cases) showed a distinct production of antibodies in the last 12 weeks of pregnancy. However, the diagnosis of haemolytic disease of the newborn does not appear to have been certain in all cases, and the authors were unfortunate not to have been able to examine the children's blood by the direct Race-Coombs test. Antepartum, in this group, there appeared to be a predominance of blocking antibody, but the amount of this quickly fell after delivery. Of the 17 mothers 3 were primiparous and 14 multiparous—a significant difference. In group 4 (20 cases) antibodies were always demonstrated ante partum and usually the amounts of the two varieties (complete and incomplete) varied inversely; in no case did they rise or fall together. Most commonly the complete antibodies diminished as pregnancy advanced and the incomplete antibodies increased. There were, however, other types of titre trend.

In 4 cases stillborn children were delivered, and in 3 of these only complete antibodies were demonstrated in the maternal serum. On the other hand, in only 3 of 12 infants born alive were blocking antibodies not demonstrated in the mother's blood. The authors point out that this contradicts Wiener's view that the incomplete antibody is of more serious import, and discuss the possibility that the incomplete antibody acts as a protective substance for the foetal red cells. The antibody titres in group 4 rose to a maximum about the second week postpartum and then declined.

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1017. **False Positive Rh Typing obtained with Commercial Anti-Rh_0 Serum.**

By R. D. PETTIT and E. EVANS. *Amer. J. Obstet. Gynec.*, **53**, 596–598, Apr. 1947.

The authors submit from St. Luke's Hospital, Pasadena, Calif., the case history of a persistent false positive Rh typing reaction with an anti-Rh_0

(anti-D) animal serum. The patient was later typed with human serum and found to be Rh-negative and to contain anti-Rh antibody together with incomplete antibody in her serum. No explanation is offered for the false reactions.

A. J. Buller

1018. **Recent Findings in Blood Groups and Blood Factors.** (Neuere Erkenntnisse aus dem Gebiet der Blutgruppen und Blutfaktoren.)

By O. KASER. *Gynaecologia, Basel,* **123**, 345–379, June 1947. 2 figs., 76 refs.

1019. **The Rh Factor in Obstetrics.**

By J. A. KLIEGER. *Wisconsin med. J.*, **46**, 698–701, July 1947.

1020. **Incidence of Isoimmunization Among Rh-negative Pregnant Women in Puerto Rico.**

By M. V. DE TORREGROSA. *Amer. J. Obstet. Gynec.*, **54**, 27–30, July 1947. 5 refs.

1021. **Treatment of Haemolytic Disease of the Newborn.** (Traitement de la maladie hémolytique du nouveau-né.)

By M. BESSIS and T. BOREAU. *Gynéc. et Obstét.*, **46**, 167–179, 1947. 20 refs.

1022. **The Inheritance of the Rh and Hr Factors.** (Ereditarieta dei fattori Rh ed Hr, e rapporti di filiazione.)

By M. TORTORA. *Arch. Ostet. Ginec.*, **42**, 110–117, Mar.–Apr. 1947. 16 refs.

1023. **Genetic Theory of Rh Types.** (Genetica Rh.)

By M. TORTORA. *Arch. Ostet. Ginec.*, **42**, 118–128, Mar.–Apr. 1947. 2 figs., 16 refs.

1024. **Fetal and Neonatal Deaths.**

By R. E. WELAND. *J. Iowa med. Soc.*, **37**, 235–237, June 1947. 7 refs.

1025. **True Knot in the Umbilical Cord Causing Death of Monoamniotic Twins in a Primipara Before Labor.**

By J. B. BOYLE and C. F. RICHTER. *Amer. J. Obstet. Gynec.*, **53**, 886–887, May 1947. 1 fig., 7 refs.

1026. **Data on Maternal and Foetal Mortality.** (Beschouwingen over de sterfte van krammvrouwen en haar kinderen.)

By G. D. HEMMES. *Ned. Tijdschr. Geneesk.*, **91**, 2331–2341, Aug. 23, 1947. 8 refs.

OBSTETRIC OPERATIONS

1027. **Our Indications and Conduct with Regard to the Use of Sulphonamides and Penicillin in Obstetric Operations.** (Nuestro criterio y conducta en relacion con el empleo de las sulfonamidas y penicilina en la cirugia obstetrica.)

By C. A. PENA MÉNDEZ and S. V. MADRID PAEZ. *Obstet. Ginec. lat.-amer.*, **5**, 147–164, May 1947.

1028. **Puerperal Gynecology. A Report of Thirty Years' Experience with Gyneplastic Repair Operations Immediately after Childbirth.**

By J. L. BUBIS. *Amer. J. Obstet. Gynec.* **53**, 787–795, May 1947. 40 refs.

1029. **Surgical Treatment of Old Perineal Tears during a New Delivery.** (Sur le traitement chirurgical des déchirures anciennes du périnée à l'occasion d'un nouvel accouchement.)

By M. LACOMME. *Bull. méd., Paris,* **61**, 313, July 21, 1947.

1030. **Present State of the Problem of Caesarean Section and its Development during this Century.** (Estado actual del problema de la cesárea y su evolución en lo que va de siglo.)

By J. BOTELLA LLUSIA. *An. Med. Cirug.*, **21**, 341–353, June 1947. Bibliography.

1031. **Aesthetic Transverse Laparotomy in Caesarean Section: Lorca's Technique.** (Laparotomia transversal estética en la cesarea. Técnica de "Lorca".)

By F. PEREZ ACOSTA. *Rev. méd.-quirúrg. Oriente,* **8**, 80–87, June 1947. 1 fig.

1032. **Experience with Extraperitoneal Caesarean Section.**

By C. C. BRISCOE. *Penn. med. J.*, **50**, 1065–1068, July 1947. 6 figs.

1033. **Cesarean Section Mortality in the Hospitals of a Small Community—A Defense of the Procedure.**

By R. A. GANDY. *Amer. J. Obstet. Gynec.*, **54**, 307–313, Aug. 1947. 1 fig., 8 refs.

1034. **Cesarean Hysterectomy.**

By R. A. REIS and E. J. DECOSTA. *J. Amer. med. Ass.*, **134**, 775–779, June 28, 1947. 22 refs.

GYNAECOLOGY

General.

1035. **Psychogenic Factors in Pelvic Pain.**

By W. R. MILLER. *J. Amer. med. Ass.*, **134**, 938–941, July 12, 1947. 2 refs.

1036. **Orthopedic Causes of Pelvic Pain.**

By H. C. PITKIN. *J. Amer. med. Ass.*, **134**, 853–857, July 5, 1947. 2 figs., 2 refs.

1037. **Nervous Pathways Involved in Pelvic Pain. Some Anatomic and Physiologic Aspects.**

By R. B. WILSON and R. D. MUSSEY. *J. Amer. med. Ass.*, **134**, 857–861, July 5, 1947. 1 fig., 35 refs.

Disorders of Function.

1038. **A Rare Case of Early Puberty.** (Raro caso de pubertad precoz.)

By J. A. YERENA. *Obstet. Ginec. lat.-amer.*, **5**, 171–177, May 1947. 2 figs., 6 refs.

1039. **The Practical Applications of Endocrines in Gynecology.**

By G. P. HECKEL. *N.Y. St. J. Med.*, **47**, 1677–1678, Aug. 1, 1947.

1040. **Practical Experience with Oestrogen Implants; Problem of Dosage.** (Praktische Erfahrungen mit Cyren-Implantationen unter besonderer Berucksichtigung des Dosierungsproblems.)

By H. R. SCHILDBACH. *Med. Klinik.*, **42**, 225–229, Mar. 1947. 9 refs.

1041. **Premenstrual Edema.**

By L. A. DAY. *Surg. Clin. N. Amer.*, **27**, 827–836, Aug. 1947. 2 figs., 18 refs.

1042. **Irregular Shedding of the Endometrium.**

By J. L. MCKELVEY and L. T. SAMUELS. *Amer. J. Obstet. Gynec.*, **53**, 627–636, Apr. 1947. 2 figs., 1 ref.

Irregular shedding of the endometrium is characterized clinically by various degrees of prolongation or increase of menstrual blood loss. Histologically, there are variations from the normal processes of shrinking, shedding, involution, and healing of the endometrium.

Thirty-four cases taken at random form the basis of the following conclusions: (1) The condition may occur at any time during active sex life. (2) There is little evidence that childbearing has any effect. However, in 9 of the cases the onset was at the time of re-establishment of menstruation following a pregnancy. In most of these post-pregnancy cases cure is spontaneous, or if loss is serious enough to need curettage this measure usually suffices. (3) Duration of bleeding varies from 7 to 15 days and bleeding is profuse. The majority of patients showed only minor degrees of anaemia, but in a few cases the haemoglobin fell considerably. (4) The cycle is disturbed in half of the patients. In 8 the cycle was less than 25 days, and in 9 was too irregular to classify (25- to 35-day cycles are considered normal). (5) Associated pathology is not infrequent. Four patients had had operations on the appendages, 1 had an endometrial polyp, 9 had myomata, 3 had thyroid disturbances, and 2 had episodes of endometrial hyperplasia.

Histological diagnosis depends on accurate timing of curettage, which should be done on the fifth day of bleeding or later. The outstanding feature of the endometrium is its irregularity. Secretion phase endometrium is retained and there is inadequate regeneration of surface epithelium. Glands show variations in proliferative and secretory changes in different fields. Stroma is usually shrunken and cellular. There is incomplete involution of all endometrial elements. The bizarre picture cannot readily be confused with any normal phase of menstrual shedding or repair.

The aetiology of the condition is not yet clear but a disturbance of endocrine control is probably responsible. Urinary excretion of oestrogens, 17-ketosteroids, and pregnandiol was determined over at least a full cycle in 6 patients with irregular endometrial shedding. In 5 of them pregnandiol was excreted during various parts of the menstrual period, and this has not been found in any other naturally occurring condition. No specific treatment can be recommended. Curettage and general therapy are only partially successful. In older patients x-ray sterilization is the treatment of choice, and 5 of the 34 patients were treated in this way. Surgery is resorted to when indicated for associated pathology or when simpler methods fail to cure a young patient; it was necessary in 7 cases. Follow-up studies of the remaining 22 patients are not complete.

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1043. **Metrorrhagia Induced Twenty Years after the Menopause by Treatment with 540 mg. of Oestradiol Dipropionate.** (L'apparition de métrorragies après 20 ans de ménopause a la suite d'un traitement par 540 mg. de dipropionate d'œstradiol.)

By E. LARTIGUAD. *Gynéc. Obstét.*, **46**, 323–326, 1947.

1044. **The Treatment of Metropathia Haemorrhagica: Suggestions for a Therapeutic Programme.**

By B. FALCONER. *Acta obstet. gynec. scand.*, **27**, 288–296, 1947. 10 refs.

1045. **Treatment of Juvenile Metropathy with "Testoviron".** (Die Behandlung der juvenilen Metropathie mit Testoviron.)

By H. ZACHERL. *Wien. klin. Wschr.*, **59**, 365–366, June 6, 1947.

1046. **The Surgical Relief of Intractable Dysmenorrhea.**

By T. L. LEE and H. F. FULLER. *Sth. Surg.*, **13**, 475–479, July, 1947. 4 refs.

1047. **Amenorrhoea in Refugees.** (Fluchtsterilität.)

By F. SIEGERT. *Dtsch. med. Wschr.*, **72**, 470–471, Sept. 5, 1947.

1048. **Diagnostic Considerations on a Case of Amenorrhoea and Persistent Lactation.** (Consideraciones diagnosticas sobre un caso de amenorrea y secrecion lactea persistente.)

By A. QUIRALTE DELICADO. *Toko-ginec. práct.*, **6**, 175–185, June 1947. 1 fig.

1049. **Parotiditis and Menstruation.** (Parotídite e menstruação.)

By C. CORREA DA COSTA. *An. brasil. Ginec.*, **12**, 357–361, May 1947.

1050. **Psychiatric Aspects of the Menopause.**

By H. E. CHAMBERLAIN. *Amer. J. Obstet. Gynec.*, **54**, 301–306, Aug. 1947. 6 refs.

1051. **Treatment of the Menopause, with Special Reference to Artifically induced Menopause.**
By D. G. DRIPS. *Surg. Clin. N. Amer.*, **27**, 820–826, Aug. 1947. 8 refs.

1052. **Treatment Based on Diagnosis During the Menopause.**
By M. C. WATSON. *Canad. med. Ass. J.*, **56**, 620–624, June 1947. 3 figs., 1 ref.

1053. **The Effect of Oestradiol-crystal Suspensions on Menopausal Women.** (Uber die Wirkung von Ostradiol-kristallsuspensionen bei klimakterischen Frauen.)
By F. HOFFMANN. *Dtsch. med. Wschr.*, **72**, 481–483, Sept. 5, 1947. 9 refs.

1054. **Post-menopausal Genital Bleeding.**
By J. K. FEENEY, *J. med. Ass. Eire*, **20**, 260–263, May 1947. 4 refs.

1055. **Folliculin in the Treatment of Gynaecological Haemorrhages.** (Folikularni hormon v léčbě gyneckologického krvácení.)
By V. VASEK. *Lék. listy.*, **2**, 380–386, Aug. 15, 1947. 7 figs.

1056. **The Use of Zinc Chloride Bougies in Uterine Haemorrhage.** (Chlorzinkstabcheneinlagen bei Uterusblutungen.)
By W. FINK. *Med. Klinik*, **42**, 378–379, May 1947. 1 ref.

1057. **Ovarian Hemorrhage.**
By J. W. JONES. *Tex. St. J. Med.*, **43**, 263-267, Aug. 1947. 10 refs.

1058. **Uterine Bleeding.**
By G. D. ROYSTON. *J. Iowa med. Soc.*, **37**, 223–230, June 1947.

1059. **The Management of Uterine Bleeding.**
By R. L. FAULKNER. *West Virginia med. J.*, **43**, 163–166, May 1947. 6 refs.

1060. **Leukorrhea: Its Causes and Treatment.**
By S. B. LOVEDAY. *Surg. Clin. N. Amer.*, **27**, 848–856, Aug. 1947. 4 refs.

1061. **Dyspareunia.**
By B. T. BEASLEY. *Sth. med. J.*, **40**, 646–653, Aug. 1947. 6 figs., 5 refs.

1062. **The Study of Sterility.**
By W. W. WILLIAMS. *Connecticut med. J.*, **11**, 722–730, Sept. 1947. 3 figs., 22 refs.

1063. **A Survey of General and Ovarian Sterility with Special Reference to Anovulation.**
By S. B. STICKNEY. *New Orleans med. surg. J.*, **100**, 26–39, July 1947.

1064. **Some aspects of Thyroid Function in Relation to Infertility.**
By D. L. DICKERSON. *West. J. Surg.*, **55**, 343–347, June 1947. 29 refs.

1065. **Hypothyroidism and its Relation to Gynecologic Problems.**
By L. W. MASON. *West. J. Surg.*, **55**, 338–342, June 1947.

1066. **The Rh Factor in Infertility.**
By P. LEVINE. *West. J. Surg.*, **55**, 462–467, Aug. 1947. 15 refs.

1067. **Practical Office Methods of Diagnosis and Management of Sterility.**
By W. J. REICH, J. L. WILKEY and M. J. NECHTOW. *J. Indiana med. Ass.*, **40**, 842–847, Sept. 1947. 5 figs.

1068. **A New Multipurpose Apparatus for Use in the Diagnosis and Treatment of Sterility in the Female.**
By A. I. WEISMAN. *Amér. J. Obstet. Gynec.*, **54**, 145–147, July 1947. 1 fig., 3 refs.

1069. **Surgery in Sterility of Tubal Origin.** (Cirugia en la esterilidad de origen tubario.)
By H. L. GUIXA. *Semana méd.*, **53**, 581–589, Sept. 26, 1947. 67 refs.

Abnormalities of the Reproductive Organs.

1070. **Congenital Absence of Vagina.** (Ausencia congénita de vagina.)
By L. ZENO and J. L. BOVERI. *An. Cirug. Rosaria*, **12**, 162–171, June 1947. 5 figs.

1071. **Treatment of Uterine and Vaginal Prolapse in Elderly Women.** (Uber die Behandlung des Vorfalls der Scheide und der Gebärmutter alter Frauen.)
By E. VOGT. *Med. Klinik*, **42**, 186–189, Mar. 1947.

Infections of the Reproductive Organs.

1072. **Penicillin in Gynaecology.** (La pénicilline en gynécologie.)
By —. MAGENDIE and —. LABARBE. *Bordeaux chir.*, 11–22, Jan. 1947. 2 figs.

1073. **Penicillin in Gynaecology.** (La pénicilline en gynécologie.)
By P. MOCQUOT and H. MICHEL-WOLFROMM. *Gynécologie*, **44**, 77–87, Mar.–Apr. 1947.

1074. **Dental Focal Infection in Relation to Gynaecological Disease.** (Dentogene Herdinfektion und gynäkologische Erkrankungen.)
By H. PASCHKE and A. VON GUNTHER. *Arztl. Wschr.*, **1/2**, 587–596, Apr. 15, 1947. 7 figs., 33 refs.

1075. **Pelvic Inflammatory Disease.**
By W. L. SMILEY. *J. nat. med. Ass.*, **39**, 157–159, July 1947. 3 refs.

1076. **Pelvic Inflammation.**
By R. F. MATTERS. *Med. J. Aust.*, **2**, 354–356, Sept. 20, 1947.

1077. **Medical Versus Surgical Treatment of Pelvic Inflammatory Disease.**
By R. B. WILSON. *Surg. Clin. N. Amer.*, **27**, 866–874, Aug. 1947.

1078. **The Wassermann Reaction in Pregnancy.** (Wassermannreaktioner hos Gravide.)
By P. KRAG and J. ROJEL. *Ugeskr. Læg.*, **109**, 493–499, Sept. 4, 1947.

1079. **Present State of Diagnosis and Treatment of Complicated Inflammatory Lesions of the Adnexa.** (Evolution présente du diagnostic et du traitement des annexites compliquées.)
By R. BOURG. *Scapel, Brux.*, **100**, 795–798, Aug. 23, 1947.

1080. **Genital Tuberculosis with Tubercle Bacilli in the Menstrual Blood. Source of Infection of Primary Genital Tuberculosis in a Man.**
By N. CLEMETSEN. *Acta obstet. gynec. scand.*, **27**, 284–287, 1947. 11 refs.

1081. **Female Genital Tuberculosis.** (Die weibliche Genitaltuberkulose.)
By E. HELD. *Gynaecologia, Basel*, **123**, 265–318, May 1947. Bibliography.

1082. **Treatment of Genital Tuberculosis of the Female.** (Traitement de la tuberculose genitale chez la femme.)
By E. DE MEURON. *Gynaecologia, Basel*, **123**, 319–344, May 1947. 17 refs.

1083. **Isolated Tuberculosis of the Corpus Uteri.** (Tubercolosi isolata del corpo dell'utero.)
By M. MORALDI. *Policlinico, Roma., sez. chir.*, **54**, 163–172, July–Aug. 1947. 4 figs., 16 refs.

1084. **Chronic Cervicitis: Analysis and Treatment on the Basis of Over 2,000 Cases.**
By W. J. REICH and M. J. NECHTOW. *Wisconsin med. J.*, **46**, 520–523, May 1947. 4 figs.

1085. **Treatment of Gonococcal Vulvo-vaginitis with Penicillin and Follicular Hormone.** (Beitrag zur Behandlung der Vulvovaginitis gonorrhoica mit Penicillin und Follikelhormon.)
By A. BASTERT-MESCHEDE. *Med. Klinik*, **42**, 423–425, May 1947. 19 refs.

1086. **Vaginitis in Adults: Some Causes, Their Diagnosis and Treatment.**
By F. C. DOBLE. *Med. Press*, **218**, 253–256, Sept. 17, 1947.

1087. **Spontaneous Salpingo-colic Fistula Complicating Pyosalpinx.**
By E. J. CROCE. *Amer. J. Surg.*, **73**, 618–620, May 1947. 2 figs.

New Growths of the Reproductive Organs.

1088. **Notes on Some Cases of Vaginal Cysts.** (Sobre alguns casos de cistos da vagina.)
By C. DO AMARAL. *An. brasil. Ginec.*, **12**, 184–189, Mar. 1947. 5 figs., 11 refs.

1089. **Selective Cytology Smear for Diagnosis of Cancer.**
By J. E. AYRE. *Amer. J. Obstet. Gynec.*, **53**, 609–617, Apr. 1947. 10 figs., 3 refs.

This report from the Gyne-cytology Laboratory attached to McGill University describes a new technique for diagnosis of cervical carcinoma based on the vaginal smear method advocated by Papanicolaou and Traut in 1943. Their method has been shown to be reliable but involves time-consuming search for malignant cells sometimes obscured by other cells. In 1944 the author modified the test by taking a smear from the external os of the cervix; he has now changed his technique so that early malignant and pre-cancerous cell changes can be more readily found. Attention has been focused on the squamo-columnar junction of the cervix, which is the site of predilection for carcinoma. The new " spatula cytology technique " aims at collecting cells before their exfoliation and, therefore, when they are in a good state of preservation. As a cancerous growth is characteristically friable, large numbers of surface cells can readily be obtained by " surface biopsy ". The author stresses the difficulty of knowing exactly where to take a surgical biopsy in a doubtful case with no naked-eye evidence of carcinoma and considers that the whole squamo-columnar junction should be examined cytologically.

The method he adopts is to expose the cervix, remove mucus from the external os, and place a special wooden spatula against the cervical opening. A rotary movement permits light scraping of the entire circumference of the squamo-columnar junction. The cellular material obtained is transferred to glass slides. The spatula has one end slightly hooked for nulliparous cervices and the other club-shaped for parous cervices. If the cervix is irregular and has a large erosion more than one approach with the spatula is advocated.

Precision in studying the material obtained is essential for the diagnosis of the transitional case. Criteria of " pre-cancer " consist of detection of the following cellular changes: (1) Cornification in cells whose nuclei are abnormally large and deeply staining. (2) Multilobulation and splitting of the nucleus into several separate nuclei in cornified and pre-cornified cells. (3) Anaplastic deep squamous cells showing considerable nuclear variability. (4) Abnormally high cornification.

The author has studied over 3,000 cases by cervical cytology tests, and is of the opinion that cervical carcinoma is mainly preventable provided that a specially skilled cytologist is available to make an accurate diagnosis in the pre-cancerous stage. Only by routine tests, regardless of symptomatology, will it be possible to take advantage of the life-saving possibilities offered by cytology, for the clinical appearance of the cervix gives no indication of the intrinsic cellular morphology. Selective cytology may also be used in the diagnosis of an accessible surface cancer.

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1090. **Early Diagnosis of Cancer of the Uterus by Cytological Examination of the Cervical Secretion.** (Diagnostic précoce du cancer utérin par l'examen cytologique des sécrétions cervicales.)
By A. GUIDOUX. *Presse méd.*, **55**, 358–359, May 31, 1947. 1 fig., 9 refs.

1091. **Carcinoma of the Uterus.**
By J. C. MASSON. *Surg. Clin. N. Amer.*, **27**, 763–774, Aug. 1947. 3 figs., 4 refs.

1092. **Multiple Carcinomata of the Uterus.**
By H. L. PEARSON. *Sth. med. J.* **40**, 728–732, Sept. 1947. 5 figs., 20 refs.

1093. **Coexistent Carcinoma and Sarcoma of the Uterus.**
By J. P. HENNESSY. *Amer. J. Obstet. Gynec.*, **54**, 336–342, Aug. 1947. 4 figs., 14 refs.

1094. **Analysis of Fibroids seen at the Obstetric and Gynaecological Clinic, Strasbourg, in 1945-46.** (Réflexions sur les fibro-myomes de l'utérus observés a la clinique obstétricale et gynécologique de Strasbourg entre 1945-46.)
By P. PAQUET. *Gynécologie*, **44**, 129–139, May–June 1947. 2 refs.

1095. **Remarks on the Treatment of Cases of Fibromyoma of the Uterus Seen in 1945 and 1946 at the Clinic of Obstetrics and Gynaecology, Strasbourg.** (Remarques sur le traitement des cas de fibromyomes de l'utérus observés en 1945 et 1946 à la Clinique d'Obstétrique et de Gynécologie de Strasbourg.)
By R. KELLER and P. PAQUET. *Rev. franç. Gynéc. Obstét.*, **42**, 193–197, June 1947.

1096. **A 55-pound Solid Uterine Myoma.**
By W. D. BEACHAM, J. A. HOLMES, H. T. BEACHAM, G. J. MITCHELL, C. G. CALLENDER and D W. BEACHAM. *Amer. J. Obstet. Gynec.*, **53**, 839–845, May 1947. 3 figs., 8 refs.

1097. **Granuloma Venereum of the Cervix.**
By S. BURRUS. *Amer. J. Obstet. Gynec.*, **54**, 135–136, July 1947.

1098. **Carcinoma of the Cervix.**
By W. P. GIVEN. *Amer. J. Obstet. Gynec.*, **53**, 947–956, June 1947. 2 figs., 8 refs.

1099. **Carcinoma of the Cervix. An Applicator for Greater Parametrial Dosage.**
By L. A. CAMPBELL. *Amer. J. Roentgen.*, **57**, 697–702, June 1947. 3 figs., 9 refs.

1100. **Carcinoma of the Cervix Primarily Diagnosed by the Stained Vaginal Spread.**
By R. E. SEIBELS. *Amer. J. Obstet. Gynec.*, **54**, 343–346, Aug. 1947. 3 figs., 5 refs.

1101. **Five Hundred and Fifty-seven Case Histories of Cervical Disease, 1944-45.**
By K. J. WILSON and C. H. WILSON. *J. Oklahoma med. Ass.*, **40**, 277–280, July 1947. 14 figs.

1102. **Radium Therapy of Cancer of the Uterine Cervix and of the Fundus.**
By R. E. FRICKE. *Surg. Clin. N. Amer.*, **27**, 775–789, Aug. 1947. 3 figs., 33 refs.

1103. **The Management of Cancer of the Cervix Uteri.**
By L. G. SIMON. *Connecticut Med. J.*, **11**, 741–742, Sept. 1947.

1104. **Statistics of 500 Cases of Carcinoma of the Cervix Uteri.** (Em torno de 500 casos de cancer do colo do útero.)
By L. M. MACHADO, E. SARMENTO and G. S. M. COELHO. *Rev. Ginec. Obstet.*, **1**, 358–368, Apr. 1947. 1 fig.

1105. **Endometriosis.**
By I. ABELL and I. ABELL, Jun., *Sth Surg.*, **13**, 321–329, May 1947.

1106. **Ectodermal Invasion of the Myometrium.** (L'invasione ectodermale del miometrio.)
By L. DE GIORGI. *Arch. Obstet. Ginec.*, **52**, 211–227, July–Aug. 1947. 4 figs., 18 refs.

1107. **Haemorrhagic Polypoid Formations of the Endometrium after the Menopause (Menge's Adenoma).** [Sulle formazioni polipose emorragiche dell'endometrio in età post-climaterica (adenoma corporeale di Menge.)]
By G. VALLE. *Ginecologia*, **13**, 257–264, June 1947. 2 figs., 3 refs.

1108. **Hyperplastic Ectopic Decidua in the Cervix.** (Eine hyperplastische, ektopische Decidua im Gebärmutterhals.)
By O. TAWAST. *Ann. chir. gynaec. fenn.*, **36**, 154–166, 1947. 3 figs., 31 refs.

1109. **Endometrial Cyst in an Episiotomy Scar.**
By J. C. BROUGHER. *Amer. J. Obstet. Gynec.*, **54**, 127–128, July 1947. 2 figs., 1 ref.

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By M. B. DOCKERTY. *Surg. Clin. N. Amer.*, **27**, 837–847, Aug. 1947. 1 ref.

1111. **A Classification of Ovarian Tumors Based Upon Histogenesis.**
By J. A. SPENCER and P. J. REEL. *Amer. J. Obstet. Gynec.*, **54**, 273–280, Aug. 1947. 18 refs.

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By J. J. ANDUJAR, G. R. ENLOE and W. B. SWIFT. *Texas St. J. Med.*, **43**, 70–73, June 1947. 2 figs., 10 refs.

1113. **Hormonal Function of Ovarian Tumours.** (Beitrag zur hormonalen Funktion von Eierstocktumoren.)
By H. HUSSLEIN. *Wein. klin. Wschr.*, **59**, 325–328, May 23, 1947. 13 refs.

1114. **Granulosa-cell Tumour with Meigs' Syndrome.** (Tumor de la granulosa del ovario con ascitis e hidrotorax (sindrome de Meigs.))
By J. BOTELLA LLUSIA and J. M. BEDOYA. *Obstet. Ginec. lat.-amer.*, **5**, 165–170, May 1947. 37 refs.

1115. **A Case of Ovarian Arrhenoblastoma.** (Een geval van arrhenoblastoma ovarii.)
By W. P. PLATE. *Ned. Tijdschr. Geneesk.*, **91**, 1407–1414, May 31, 1947. 13 figs.

1116. **Primary Carcinoma of the Fallopian Tube.**
By E. A. EDWARDS and R. A. BEEBE. *Amer. J. Obstet. Gynec.*, **53**, 1049–1053, June 1947. 3 figs., 8 refs.

1117. **Primary Carcinoma of the Fallopian Tube.**
By M. VESELL and H. SCHNEIDER. *Amer. J. Obstet. Gynec.*, **54**, 140–144, July 1947. 4 figs., 18 refs.

1118. **Minute Nodules and Cysts of a Fallopian Tube: Case Report.**
By M. R. MOORE. *Connecticut med. J.*, **11**, 619–620, Aug. 1947. 2 figs., 4 refs.

See also Nos. 910, 911, 912, 941.

Operations.

1119. **New Surgical Technique of Approach to the Appendix and Female Internal Genital Organs.** (Nova técnica na via de acesso ao apêndice e orgãos genitais internos femininos.)
By A. AUGUSTO. *An brasil. Ginec.*, **23**, 40–47, Jan. 1947. 6 figs., 13 refs.

With the patient lying on her back, a transverse incision 6 cm. long is made over the right rectus muscle, 3 cm. below the line joining the anterior superior iliac spines. The rectus sheath is opened in the line of the muscle fibres; the muscle is then retracted laterally and the fascia transversalis and peritoneum are opened longitudinally. With this incision a good exposure of the adnexa and appendix is obtained.

Closure is made in three planes. The advantages are that: (1) the incision follows the lines of tension of the skin; (2) lateral retraction of the rectus does not interfere with the blood supply; (3) lateral retraction of the rectus also facilitates approach to the left Fallopian tube and aids manipulation of the appendix. This technique is advised in doubtful cases of appendicitis or adnexitis and is not intended to take the place of the classical incisions of McBurney and Pfannenstiel.

Jorge D. Mineiro

1120. **Surgical Geriatric Gynecology.**
By A. F. LASH. *Amer. J. Obstet. Gynec.*, **53**, 766–775, May 1947. 21 refs.

1121. **Immunization before Gynaecological Operation.** (In tema di preparazione immunitaria preoperativa ginecologica.)
By A. RIZZUTI. *Ginecologia.* **13**, 299–303, June 1947.

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By J. H. PRATT. *Surg. Clin. N. Amer.*, **27**, 807–819, Aug. 1947. 12 refs.

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By H. R. MALLORY. *J. nat. med. Ass.*, **39**, 154–156, July 1947. 30 refs.

1124. **Clinical Factors Predisposing to Thrombosis in Postoperative Gynaecological Cases.** (Vilka kliniska faktorer disponera för postoperativ trombos hos gynekologiska patienter?)
By E. WELTMAN and P. WETTERDAL. *Nord. Med.*, **35**, 1669–1672, Aug. 8, 1947. 27 refs.

1125. **Role of the Cardiologist Before and After Operation for Uterine Myoma.** (O papel do cardiologista no pre e postoperatorio das doentes portadoras de mioma uterino.)
By A. POLIZZI. *Rev. Ginec. Obstet.*, **1**, 492–496, June 1947.

1126. **Conservative Surgery of Bilateral Inflammation of the Adnexa.** (La chirurgie conservatrice dans les annexites bilatérales.)
By G. COTTE. *Bull. Acad. nat. Méd., Paris*, **131**, 301–304, May 6, 1947. 4 refs.

1127. **Total Hysterectomy.**
By E. W. MUNNELL. *Amer. J. Obstet. Gynec.*, **54**, 31–39, July 1947. 1 fig., 26 refs.

1128. **Peritoneoscopy.** (Peritoneoscopia.)
By G. V. DE AZEVEDO. *Rev. Ginec. Obstet.*, **1**, 475–484, June 1947. 9 figs., 17 refs.

1129. **Description of Various Types of Colposcopes. The Colpoprojector and Colposcopic Photography in Colour.** (Description de distintos modelos de colpos-

copio. El colpoproyector y la fotografia colposcopica en color.)

By C. ALBA MENENDEZ. *Toko-ginec. pract.*, **6**, 186–206, June 1947. 11 figs., 20 refs.

1130. **Intravasation of Lipiodol During Uterosalpingography.**

By A. D. PIATT. *Ohio St. med. J.*, **43**, 821–824, Aug. 1947. 5 figs., 14 refs.

1131. **An Office Procedure for Hysterosalpingography.**

By A. P. HUDGINS. *West. J. Surg.*, **55**, 407–413, July 1947. 3 figs.

1132. **Biopsy of the Endometrium.** (Biopsia de endometrio.)

By J. WOOD and E. GARCES. *Bol. Soc. Chil. Obstet. Ginec.*, **12**, 4–17, April 1947. 1 fig.

1133. **Labhardt's Operation for Genital Prolapse in Aged Females.** (L'opération de Labhardt dans les prolapsus génitaux des femmes agées.)

By J. MATHIEU. *Lyon chir.*, **42**, 320–328, May–June 1947. 7 figs., 13 refs.

1134. **The Treatment of Uterine Prolapse.**

By R. A. KIMBROUGH. *New Orleans med. surg. J.*, **100**, 16–20, July 1947. 17 refs.

1135. **In Which Cases should Retroflexion of the Uterus be Operated upon?** (In welchen Fällen soll eine Retroflexio Uteri operativ behadelt werden?)

By F. V. MIKULICZ-RADECKI. *Arztl. Wschr.*, **1/2**, 545–550, Mar. 30, 1947.

1136. **The Selection of Patients and a Technic for Vaginal Hysterectomy.**

By J. M. WAUGH. *Surg. Clin. N. Amer.*, **27**, 796–806, Aug. 1947. 3 figs.

1137. **Panhysterectomy and Subtotal Hysterectomy: Indications and Technic.**

By V. S. COUNSELLER. *Surg. Clin. N. Amer.*, **27**, 790–795, Aug. 1947.

1138. **Analysis of Pelvic Operations Preceding Hysterectomy. Causal Relationship.**

By C. TYRONE. *Ann. Surg.*, **125**, 669–672, May 1947.

See also Nos. 853, 1077.

Urology.

1139. **Operation for the Cure of Incontinence of Urine in the Female.**

By R. T. FRANK. *Amer. J. Obstet. Gynec.*, **53**, 618–626, Apr. 1947. 5 figs., 9 refs.

The fact that many operations have been devised for the cure of incontinence associated with vesical-neck weakness suggests that none of these procedures is completely effective. The author's interest has been focused particularly on the difficult cases in which one to three previous operations have been unsuccessful or have actually aggravated the disability. The success of his operation depends on demonstrating and utilizing: (1) the fascia propria of the bladder; (2) the pubo-cervical layers of the endopelvic fascia; (3) the remains of the triangular ligament.

A median vertical incision is made in the anterior vaginal wall from a point 1 cm. below the urethral orifice to the fixed portion of the mucosa over the portio. The pubo-cervical fascia and fascia propria of the vagina are together peeled away from the vaginal mucosa. The bladder is then mobilized and the deficiency of its fascia propria at the bladder neck demonstrated. Fine chromic-gut sutures are inserted across this deficiency to fashion a V-shaped collar at the urethro-vesical junction, tight enough to indent the urethra slightly. The separated layer of pubo-cervical fascia is now approximated from below upward. The lowest two sutures include the "bladder pillars" and tack the fascia to the cervix. The higher ones overlap the fascia in front of the bladder, the topmost one forming a second V-shaped sling slightly higher than the one previously formed by the fascia propria. The remains of the triangular ligament lateral to the urethra beneath the pubic bones are grasped on each side with a blunt haemostat. Two chromic sutures are inserted uniting these structures snugly in front of the urethro-vesical junction. Vaginal mucosa is resected if necessary and the wound closed. A catheter is left in for 5 days and the patient gets up on the tenth day.

Satisfactory results have been obtained by this method over a period of years. Nineteen private patients operated on in the last 10 years have been followed up. Four had had more than one previous unsuccessful plastic operation. Two were cured and 2 showed 75 per cent improvement. Of the 15 remaining 12 were cured, 2 improved, and 1 was unimproved (age 70 years). One patient, aged 12 years, was born with a vaginal anus and had no control of urine or faeces. The anus was transplanted and the above operation performed on the urethra. As a result, full urinary control and partial rectal control were obtained.

[The recent popularity of the Aldridge, Studdiford, and Millin fascial sling operations for incontinence persisting after plastic vaginal operations is now being challenged by various modifications of the older vaginal procedures. It will be interesting to see which type of operation gives the most satisfactory long-term result.]

Doreen Daley

1140. **Management of Urinary Incontinence in Women.**

By D. O. FERRIS. *Surg. Clin. N. Amer.*, **27**, 857–865, Aug. 1947. 8 figs., 5 refs.

1141. **Gynecological Operations in the Treatment of Stress Incontinence of Urine.**

By A. PHILLIP. *Urol. cutan. Rev.*, **51**, 80–81, Feb. 1947.

1142. **Incontinence of Urine due to Peripheral Nerve Lesion after Total Extirpation of the Uterus.** (Urin-incontinens paa Grund af perifer Nerv-laesion efter Totalexstirpation af Uterus.)

By M. ANDREASSEN. *Nord. Med,* **34**, 911–912, Apr. 18, 1947. 1 fig., 4 refs.

1143. **Extravaginal Plastic Repair of the Pelvic Floor for Prolapse of the Bladder Neck. A New Method to Operate for Stress Incontinence.** [In English.]

By A. INGLEMAN-SUNDBERG. *Gynaecologia, Basel,* **123**, 242–254, Apr. 1947. 10 figs., 42 refs.

1144. **Stress Incontinence.**

By E. HOCK. *J. Urol.*, **57**, 1069–1084, June 1947. 18 refs.

1145. **The Surgical Treatment of Urinary Incontinence.**

By M. J. BARTLETT. *New Engl. J. Med.*, **236**, 965–969, June 26, 1947. 6 figs., 17 refs.

Miscellaneous.

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By T. D. EFSTATION and H. HYSLOP. *J. med. Ass. Alabama,* **17**, 4–9, July 1947. 3 refs.

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By A. GOUVEIA. *An. brasil Ginec.*, **12**, 161–183, Mar. 1947.

1148. **Report of Primary Torsion of the Right Fallopian Tube.**

By M. A. HOWARD. *West. J. Surg.*, **55**, 295–296, May 1947. 3 refs.

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By S. KAISER. *An. brasil. Ginec.*, **12**, 362–385, May 1947. 6 figs., 19 refs.

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